

CAESAREAN SECTION

THE HISTORY AND DEVELOPMENT OF THE  
OPERATION FROM EARLIEST TIMES.

by

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(Edin.).

October 1942.



I, THE UNDERSIGNED, HEREBY CERTIFY  
THAT THIS THESIS IS MY OWN WORK  
AND HAS BEEN COMPOSED BY MYSELF.



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INTRODUCTION- DEFINITION - EARLY ORIGIN

"That operation is called Caesarean by which any way is opened for the child than that destined for it by nature. Though for that purpose we sometimes cut through the common and proper coverings of the abdomen, we are generally obliged to open the uterus also, and it is particularly in this latter case that the operation has received the name Caesarean; for in the former it may be expressed simply by that of Gastrotomy. It seems to me useless to distinguish into abdominal and vaginal, as has been done lately; comprehending under that new denomination all operations performed in the neck of the uterus without affecting the neighbouring parts; for we might with as much reason give the name to incisions in the perineum, to sections of bridles or cicatrices which narrow the vagina; to that of the hymen, tumours etc., if the child could not be borne without these aids."

Such was the definition of the operation of Caesarean section given (1790) by that great French obstetrician, M. Jean Louis Baudelocque (1746 - 1810), over 150 years ago. It could not be improved upon. The term "vaginal Caesarean section" is still used in textbooks, but the term "vaginal hysterotomy" is much to be preferred as suggested by such writers as Williams (1930), Newell (1931), Munro Kerr (1937) and others. In a case of true Caesarean section, an incision through the wall

of the uterus is a necessary part of the operation. Newell (1931) says "The name is not properly applied to operations for the removal of the child from the abdominal cavity after rupture of the uterus, or for the delivery of a child in cases of abdominal pregnancy, but should be restricted to the abdominal delivery of a child normally situated in utero." It was on these grounds that Simmons (1798) threw doubts on Barlow's case - the first successful Caesarean section in England (1793) - being a true Caesarean section. In his description of the operation, (of which a detailed account will be given later) Barlow (1798) said "The uterus was very thin, scarcely exceeding that of the peritoneum, and equally so through the whole extent of the incision." Simmons suggested that that which Barlow incised was not the wall of the uterus, but the bag of waters which contained the child and had escaped into the abdominal cavity.

Surprising though it may seem this operation is one of the oldest in the history of medicine, and without doubt the greatest; the oldest in that the history of its origin is lost in the mists of antiquity, and the greatest in that it is the only operation in which two lives are concerned. Few surgical procedures have been the subject of such bitter controversy and it is only in the last 60 years, or thereabouts, especially in this country, that it has changed from a last minute attempt to extract a living child from a mother almost moribund, to a carefully planned operation, done at a selected time.

It was the advent of asepsis, following the work of Pasteur and Lister, plus the introduction of anaesthetics and marked improvement in technique, which brought about this happy change.

The origin of the name of the operation is still obscure, and periodically comes under discussion both in medical and classical journals. The popular belief is that Julius Caesar was brought into the world by this means. It is almost certain, however, that this derivation is incorrect, as Aurelia, the mother of Julius Caesar, was still alive when the Emperor undertook the invasion of Britain. Such a recovery in times when the sciences of anatomy and surgery were so rude and imperfectly understood is scarcely creditable, and as Campbell (1833) points out, it is not at all probable that a Roman slave could have had the audacity to propose, more especially to one of the first patrician families in Rome, so desperate an alternative, particularly during such ages of despotism and tyranny. It is surprising to find, in a book published as recently as 1932, (to the credit of the medical profession be it said that it is not a medical book), the definite but quite erroneous statement that the operation of Caesarean section was performed in the case of Julius Caesar.

In the writings of Pliny (A.D.23 - 79), called the Elder, to distinguish him from his nephew, who was also a writer and bore the same name, we find in Book VII of his Natural History, the following passage:-

"Auspiciatius enecta parente gignuntur; sicut Scipio Africanus prior natus, primusque Caesarum, a caeso matris utero dictus; qua de causa et Caesones appellati Sinuli modo natus est manituis qui Carthaginem cum exercitur intravit."

The meaning here is not quite clear. The "primusque Caesarum" may refer to Scipio Africanus, or to the first Caesar, who was so called from being cut from his mother's womb. It is certain that Julius Caesar was not the first of his name, since there is mention in Roman History of a priest named Caesar who lived at a considerably earlier period. Nor is it certain that Scipio Africanus (237 - 183 B.C.), was the first to bear the name of Caesar, for Salmasius notes that there existed a Caesar before the Samnite War (343 B.C.) Pliny was noted for his lively imagination, and it seems likely that in stating that Caesar was derived from "a caeso matris utero" he was exercising it to the full. We may note in passing the remarks of Saccombe, (1799), leader of the anti-Caesarean school in France towards the end of the 18th century. He said "Pliny was a lying historian whom it would have cost no more to have split the belly of Aurelia with his pen in order to deliver Caesar, than to split the rocks with vinegar to open up a way across the Alps for the troops of Hannibal."

The earliest writers of medicine are silent on the subject of Caesarean section, and it seems more

and therefore that it simply implies delivery by means of

than probable that if either Julius Caesar or Scipio Africanus had been brought into the world in the manner suggested by Pliny, Celsus, who lived before him, and wrote his book, *De Re Medica*, about A.D.30, the best book of its time, would not have failed to take notice of this method of preserving the life of the child, even after the death of the mother. Yet he gave careful directions for the extraction of the dead child from the mother by means of the crochet.

Another suggestion is that Caesar was the name given to the Julia family because one of them kept or killed an elephant. In the Punic tongue, Caesar signifies an elephant. The medals of Caesar as Dictator of Rome confirm this hypothesis; on the reverse is an elephant crushing a serpent beneath its feet. This symbol most likely had its origin in a punning desire of Caesar himself; for Addison tells us that "when Caesar was one of the masters of the Roman Mint, he placed the figure of an elephant on the reverse of the public money; the word Caesar signifying an elephant in the Punic tongue. This was artificially contrived by Caesar because it was not lawful for a private man to stamp his own figure upon the coin of the Common wealth." He may be said to have adopted a symbol then as people do nowadays in adopting some effigy as a crest.

Again there is the suggestion that the term is derived from the Latin verb '*caedere*', meaning to cut, and therefore that it simply implies delivery by means of

cutting; which is quite probable, since children delivered from dead mothers by abdominal section were known as "caesones". Festos wrote "Caesones appellantur ex utero matris exsicti; Caesar quod est cognomen Juliorum a caesarei dictus est, quia scilicet cum caesarei natus est." This origin of the word was strongly supported by Hull (1799). Haggard and Newell (1931) on the other hand, favour quite a different explanation. In 715 BC., Numa Pompilius, King of Rome, made a law, included in the Lex Regia, whereby it was forbidden to bury a pregnant woman until the child had been removed from her abdomen, even when there was but little chance of the survival of the child, in order that the child and mother might be buried separately. Newell suggests that the Lex Regia became the Lex Caesarea under the rule of the emperors, and thus the operation became called the Caesarean operation. Other suggestions are that the name came from the fact that one of the Julia family born by the operation had blue eyes (oculis caesios), and that the operation was too grand to have been performed on ordinary mortals, so was called after Caesar, meaning emperor, just as the Germans gave it the name Kaiserschnitt in the days when Kaisers were important personages. This last suggestion is made by Spencer (1923) and seems not unlikely. The term Caesarean birth was first used by Rousset (1581) (enfantement Caesarian) in his book published in 1591.

The first to use the term "section" in connection with this operation was Jacques Guillimeau in his book of



midwifery published in 1598, and translated into English in 1612, not Theophile Raynaud in 1637, as erroneously stated by one writer. For a long time the term Caesarean operation was still used, however, and it is only during the present century that it seems to have been entirely replaced by "Caesarean section".

While the antiquity of the operation is thus definitely established under early Roman civilisation, and among the ancient Hindus the section was performed if movements of the foetus were detectable after the death of the mother, and there is some slight evidence that it may have been known to the early Egyptians, it is impossible or difficult to ascertain when it was first performed. It is referred to by ancient mythologists and poets, who were particularly fond of ascribing marvellous births and parentage to their gods and heroes. According to Ovid, Aesculapius, the god of physic, owed his birth to this operation and the operator was no less a personage than Apollo:-

"Ut tamens in gratos in pectore fudit odores.  
Et dedit amplexus, unjastaque justa perigit;  
Non tulit in cineres labi sua Phoebus eosdem  
Semina, sed natum flammis uteroque parentis  
Eripuit, geminique tulit Chironis in Antrum."

(Metam. lib. 11. Feb. 8. V. 626.)

And again we read that the life of Bacchus was preserved by the same means when his mother Semele had been consumed under the embrace of Jupiter, who

according to her desire and his extorted promise,  
visited her in all the majesty of the skies:-

"Corpus mortale tumultus  
Non tulit aethereos; donisque jugalibus arsit  
Imperfectus adhuc infans genetricus ab alvo  
Eriptiur, patrioque tener (si credere dignum)  
Insuitur femori;maternaue tempora complet."

Therefore it would appear that the world is indebted  
for two of the best things in life - Physic and Wine -  
to this operation.

Likewise according to his having been born in a  
similar way, Virgil represents Lycas, one of his  
heroes, as sacred to Apollo:-

Inde Lycum ferit, exsectum jam matri peremta  
Ex tibi Phoebe, sacrum, casus evadere ferri  
Cui lieuit parvo.

(Aen. lib.X. Line 315 etc.)

The authenticity of such statements is, of course,  
very doubtful, but it may be that they suggested the  
practicability of bringing forth children in this  
manner.

An ancient oriental sacred story, quoted by  
Mackenzie (1927) describes the operation so clearly,  
besides referring to the use of an anaesthetic, that  
it is worth transcribing in full:-

"The wife of King Sol became pregnant, but the  
child was so large that she could not bring it into

the world, and so came nigh unto death. Then there appeared unto the King, the Simurg and he advised him to give to his consort a medicine, consisting of hyoscyamus, whereby she fell into a death-like sleep, and became devoid of all feeling. When this had come to pass, her body was cut open and a great lusty son, which received the name of Rustum, was taken therefrom. Then the cut was sewn together, Simurg laying a feather on it, and it was soon healed. A certain substance was held under the nostril of the sleeping woman, and its smell woke her up again from sleep. (Petermann, Das W.11. 347).

Shakespeare has not overlooked the advantage he might derive from the incident with which tradition has invested the birth of Macduff, in his play, Macbeth. He obtained the material for this tragedy from the Chronicles of Holinshed, who took the story from the Scotorum Historiae of Boece (Paris 1526), and he in his turn, got it from Fordun ( ? 1385). The last hope and frantic desperation of Macbeth, built upon the apparition's prophecy,

"I bear a charmed life which must not yield

To one of woman born" -

suddenly forsakes him when Macduff declares to him the manner in which he was introduced into the world -

"Despair thy charm,

And let the angel whom thou still has served.

Tell them Macduff was from his mother's womb,

Untimely ripped."

Bucknill (1860 ) deduced, probably correctly, from the use of the word "untimely" that Shakespeare intended to allude to the post-mortem performance of the operation. Gould and Pyle (1897), for no very obvious reason, suggest that in Macduff's case, the operation "was possibly crudely done - perchance by a cattle horn." Shakespeare makes another reference to the operation of Caesarean section in his work "Cymbeline" (V.4) of 1610., where the mother in the vision claimed that Lucina had not lent her aid, but had taken her during the course of childbirth so that Posthumus, a thing of pity, had to be ripp'd from her, and so was born alive. The description of the operation as a "ripping " of the womb, Shakespeare obtained from Holinshead, so, as the same expression is used in both works, it is fairly safe to assume that one source is responsible and discredit the suggestion that Macduff's mother had been gored by a bull.

None of these references would justify a belief that the operation was performed on a living woman, but it would appear fairly safe to assume that a large proportion, if not all, of the early races recognised the propriety of Caesarean section on women who died late in pregnancy, in the hope of preserving a foetal life which might prove to be of value to the community. According to Boley, (1935) the oldest authentic record of a living child, born by means of the operation, is that of Gorgias, a celebrated orator of Sicily, 508 B.C.

The operation has had to run the gauntlet of religious criticism. Mohammedanism absolutely forbids it, and directs that any child so born must be slain forthwith, as it is the offspring of the Devil. In consequence of the influence of modern thought this injunction is not strictly observed. Christianity, on the other hand, being concerned with the saving of souls as well as the lives of the children, in the Roman Ritual dealing with the baptism of the child, it is ordered that the operation be performed as soon as possible after the death of the mother; but it is not permitted to sacrifice the mother's life to save that of the child. It is stated by Fasbender (1906) that two of the Church's dignitaries were brought into the world by means of this operation - Burcard, Abbot of St. Gallen, surnamed Ingentius, in A.D. 959, and Gebhard, who was Bishop of Constance in A.D. 980.

There is a tradition that Robert 11, King of Scotland, was born by means of the Caesarean section, an accident having befallen his mother. On March 2nd, 1316, whilst returning from attending the services in Paisley Abbey she was thrown from her horse. She was seriously injured and immediately seized with labour pains. Sir John Forrester, one of her followers, in virtue of having acquired some surgical skill in the wars, was entrusted by her retinue with the performance of the Caesarean section, this being considered the only chance

of saving the child. The child was duly delivered alive, but with an eye injury which was destined to cause him much trouble in later life, being subject to violent attacks of inflammation. In consequence of his appearance, as the custom of distinguishing sovereigns of the same name by the order of their succession was not then introduced, and as they generally received a nick-name derived from their appearance, he was called King Blear-eye, later contracted to King Blearie. As for the unfortunate mother, she died immediately and was buried in Paisley Abbey in a chapel known as the "sounding aisle" on account of its remarkable echo. Such is the substance of the story as given by George Crawford in his "History of Renfrewshire" 1710. Rutherford, (1937) said that this story is mentioned by James Mitchell in his "The Scotsman's Library; being a collection of anecdotes and facts illustrative of Scotland and Scotsmen" 1825, and that it seems to have been generally overlooked by historians. Hull mentioned it in his second letter (1799). Sir Walter Scott gives another explanation of the name King Blearie. In his "Tales of a Grandfather", he says at his accession, "the Earl of Strathearn was now fifty-five, and subject to a violent inflammation in his eyes which rendered them as red as blood. From these causes he lived a good deal retired." There are, however, grave doubts as to the accuracy of Crawford's story. In

Holinshed's Chronicles there is sub anno 1318, "Robert Steward, the sonne of Walter Steward, and Margerie Bruse, was borne, which Robert, after the death of K. David le Bruse, was preferred to the Crowne." And sub anno 1319, "About the same time died Margerie Bruse, King Robert's daughter." If Holinshed is to be accepted, it is obvious that Crawford's story is incorrect. Dalrymple, in his Annals of Scotland, discredits the whole story, and rightly too, mainly on account of the silence of contemporary historians, although, as Rutherford suggests, he might also have advanced the theory, that a woman of such gentle birth is unlikely to be riding on horseback when so far advanced in pregnancy.

Another royal personage who is supposed to have been born by means of Caesarean section, on October 12th, 1537, was Edward VI, son of Henry VIII, and Jane Seymour. Sir John Hayward, in 1630, appears to have been the first to put this fact on record. He wrote "All reports do constantly run that he was not by natural passages delivered into the world, but that his mother's body was opened for his birth and that she died of the incision the fourth day following." Holinshead (1577), in recounting the birth, made no mention of operation and later historians went out of their way to deny such a statement. Thus Fuller (1655) declared "For his birth, there goeth a constant tradition that, Caesar-like, He was cut out of the belly of his mother,



Jane Seymour; although a person of great Honour (deriving her intelligence immediately from such as were present at her labour) assured me of the contrary." Again, Oldmixon (1739) stated that "she died 12 Days after the Prince's Birth; not by the cruelty of Surgeons ripping up her belly to make way for the Child; but after being well delivered and of a Distemper incident to Women in her Condition."

Hayward's work was included in a "Complete History of England" by various authors, published in 1706. The editor of this publication noted that "none of our historians that wrote before Hayward gave any countenance to this, but only mention her departure soon after, except it be Sanders (when pen was directed not so much by truth as by malice), who frames a story that when the Queen was in extreme labour they asked the King whom he would have spared - "The Queen or his son?" He answered "His son - because he could easily find other wives." But even he has not a word of cutting the young infant out of his mother's belly."  
(Churchill 1841)

How such a story originated has never been discovered but it was frequently mentioned in various poems and ballads published many years ago. The descendants of the Queen (the Somerset family) could throw no light in the matter. (Clippingdale 1921).

There appears to have been considerable confusion as to the exact number of days that the Queen survived her son. Holinshead (1577) said two as did Rapin (1733), Hayward four but the



correct number would appear to be twelve. The records of the Herald's College confirm this fact and a letter from Norfolk to Cromwell, dated October 23rd, 1537, shows that the Queen was still alive although dying, (Gardner 1891).

The mere fact that the Queen lived twelve days after delivery must weigh against Caesarean section. The operation had never previously been performed in England and it seems highly improbable that the first lady of the land should be chosen for such an experiment, even although Henry's passionate desire for a son was well known. The Queen dictated a letter to the Privy Council on the same day as she was delivered, intimating the birth of a Prince, but there is no mention of an operation.

So it would appear that the stories of the births of two royal personages by Caesarean section is without foundation.

Caesarean section in the living is of more recent date, but its beginnings, too, are utterly obscure. It is quite possible that it was known to certain of the early races, notably the Jews. In the Mischnagoth, which is the oldest of this people, published in 140 B.C., and earlier according to some, and in the Talmud, which is the next oldest book, the Caesarean section is mentioned in terms as to make it extremely probable that it was resorted to before the start of the Christian era. In the Mischnagoth is the following "In the case of twins, neither the first

child which shall be brought into the world by the cut in the abdomen, nor the second, can receive the rights of primogeniture, either as regards the office of priest, or succession to property." In a publication called the Nidda, an appendix to the Talmud, there is the following remarkable direction:- "It is not necessary for women to observe the days of purification, after removal of a child through the parieties of the abdomen."

Maimonides, writing a commentary on the Nidda, expressed the opinion that the direction given advised that, she should be opened by an incision made in her side, and in this way delivered of her child. How the operation was performed, Salomo Jasbi, a very learned Rabbi, who has written a commentary on the Nidda, informs us in the following words:- "The abdomen must be opened by Samm, the child extracted, and then the parts healed." Samm, in this passage, has a different signification from that in which it is generally employed. It usually means "Aroma", or a substance which penetrates everything by its smell, but here it evidently signifies an instrument which was sufficiently sharp for the division of various parts." Children delivered through the flanks of their mothers were given the name of "Jotze Dofan" by the ancient Jews. (Mansfield 1826).

Such passages as these must be taken as very strong proof that the Caesarean section was more or less familiar to the public about the period in question, and to quote from Campbell, 1833, "how natural is the conclusion

that it had frequently been performed in the living subject with success; particularly when it is known that in the same work, there are several controversies as to the necessity of females, after delivery by this operation, observing the days of purification." It would appear, therefore, as far as can be proved, that the operation was performed in early times among the Jews; although no particular cases are mentioned, (for there are none on record), still the operation is so frequently mentioned in the old Rabbinical writings that the fact of its having been performed long before the 16th. century seems placed beyond all doubt.

Perhaps the strongest suggestion of the possible early development of Caesarean section on the living among uncivilised peoples is furnished by Felkin's account of the operation as it was performed by a native surgeon in Uganda, and witnessed by Felkin (1884) himself. The operation was performed at Katura in 1879, in a primipara 20 years of age, who was first reduced to a state of semi-intoxication with banana wine. The patient was fixed to the bed with bands of cloth placed over the thighs and thorax, while the ankles were held by an assistant. The operator evidently possessed distinctly more knowledge of asepsis than his civilised confreres of that period, since before commencing the operation, he washed the patient's abdomen and his own hands with banana wine, instead of deferring the cleansing of the hands until after the operation, as was customary among civilised practitioners at that time.

The surgeon then made a rapid mid-line incision from the pubis and umbilicus through the whole thickness of the anterior abdominal wall, and through part of the uterine wall. Bleeding from the parieties was arrested by means of a red-hot iron, sparingly applied. The incision in the uterus was then completed, the child removed, the cord clamped, and the child handed to an assistant. The uterus was massaged to make it contract, and the cervix uteri dilated with the fingers. The placenta and blood clots were then removed through the abdominal wound. Further haemorrhage from this region was checked by use of the red-hot iron. The uterus was not sutured. A porous grass mat was placed over the wound, secured there, and the various bands which secured her being removed, the patient was turned over so that the fluid in the abdominal cavity would run out on to the floor. She was then replaced in her former position, and the mat being removed, the edges of the abdominal wound were brought into close apposition, seven thin iron spikes, well polished and resembling acu-pressure needles, being used for the purpose and fastened by a string made from bark cloth. The wound was dressed with a paste made from roots, covered with a warm banana bag, and a firm cloth placed round the abdomen. The woman stood the operation in silence until the pins were placed in position. The wound was dressed on the third, fifth and sixth days, one or more pins being removed on each occasion. The temperature never rose above 99.6 F.,

except on the second night after the operation, when it was 101<sup>0</sup> F., and the pulse 108. The wound was entirely healed by the eleventh day, and the woman appeared to make an excellent recovery. Such a well developed technique suggests that the operation had been known and practised for a long time.

There are, in the literature, records of a number of cases in which impatient and ignorant women have performed the operation of Caesarean section upon themselves, women who were most unlikely to have had knowledge of such an operation. History being largely a repetition of what has gone before, it appears not unreasonable to infer that the self-inflicted operation must have been performed thousands of years ago. The oldest known case occurred in 1769. Mosely (1795) related that, in that year, a negro woman (belonging to Mrs. Bland, a mid-wife) a four-para, being in labour, performed the operation upon herself, and took her child out of the left side of her abdomen by cutting boldly through it into the uterus. She performed the operation with a broken butcher's knife about two and a half inches in length. She made the incision near the linea alba, and cut sufficiently deep to cause a wound in the thigh of the child three inches deep and two inches long. The child "came out by the actions of his own struggling." A negro midwife who was called in cut the umbilical cord and returned the portion attached to the placenta, and a considerable portion

of protruding intestine into the abdomen. The surgeon who attended the plantation was sent for a few hours later, and judging from the situation in which he found her, that some dirt had been put into the wound by the old midwife, he removed the stitches inserted by the midwife, carefully washed the parts clean, removed the placenta, and restitched the wound. The woman was exhausted for a few days as a result of the considerable haemorrhage which had occurred; fever then set in which yielded to treatment, and in six weeks from her self-infliction she was able to resume work. Her first three labours had been without incident, but being a violent tempered woman, she resorted to section to obtain more rapid relief than she would obtain under the method of nature. At her next labour, two years later, she had to be carefully watched to prevent repetition of the experiment, and submit to natural delivery. The child appeared strong and healthy when born, but died on the sixth day of the "jaw-falling" (trismus nascentium) a prevalent and very fatal malady among black infants in the West Indies.

A very similar case was described by Cawley (1785). The description of it is so like that mentioned above that it may have been the same case. It does differ on two points, namely that the woman herself removed the placenta, and a negro horse doctor did the "repair" operation. Further the woman is stated to have died of dysentery on the ninth day. A striking similarity



in the two cases, if indeed they were two different ones, is that in both instances, the child was wounded in the first case in the thigh, in second in the buttock. Harris (1888) does not mention Cawley's case in his collection, made up to 1888, of six cases with five recoveries.

The first Caesarean section performed in the United States was a self-inflicted operation (McClellen 1822). The operator and subject was a quadroon, fourteen years of age, illegitimately pregnant with twins, and in active labour, when she opened her abdomen with a razor, while lying in a snowbank. The incision was L-shaped, and extended through the abdominal wall into the fundus of the uterus. She had delivered herself per vias naturales of an infant which she had buried in the snow, and a second was protruding through the wound. Drs. Basset and McClellen, who were called in, removed the protruding infant and dressed the wound after closing it with interrupted sutures. In a few weeks the patient recovered and she was seen by Basset, six years later, alive and well. The fate of the children is unknown. The date of this remarkable occurrence was January 29th, 1822.

Barker (1830) described two other cases which occurred in America. In the first of these, a woman who had previously endured a very tedious labour, on being abused by her husband, made an incision in the left side of her abdomen with a weaver's knife. When

Barker arrived the woman was drenched in blood and apparently dead. A dead child was removed from the abdomen and the woman's wound dressed, but she only lived forty hours. In the second case a razor was the instrument and the woman was fortunate enough to recover.

Another remarkable case occurred about 1879, in Turkey. A peasant woman, after being three days in labour with severe but ineffectual pains, in desperation cut open her abdomen and uterus with her husband's razor. A neighbour who was summoned sewed up the abdominal wound, and both mother and child were reported as "perfectly well" several months later. The history of this case is rather scanty. Harris endeavoured to obtain details but apparently without result.

Madigan (1884) related the case of a woman who, in her seventh confinement, while temporarily insane, cut open her abdomen and uterus with a razor and pulled out a male child. She was not seen by any medical man until three hours after the operation, when the child was found lying by her side, dead, together with the placenta. Neighbours who found her were so frightened that they ran away and no action was taken to try to save mother or child until a clergyman arrived when it was too late.

Von Guggenberg cited a remarkable case (1876). He was summoned to the patient at 2 a.m. on Sept. 28th 1876. He found her lying in a miserable house, in a wretched and dirty bed, exhausted and bloodless, and



only capable of answering questions by means of signs. On removing a dirty petticoat which covered her, an incised wound was seen on the right side of the abdomen. A large coil of intestine, covered with dried blood, protruded through the wound, resting upon a dirty blood-stained sack. Haemorrhage had ceased and the uterus was firmly contracted. A fully developed, but dead, male child lay between the patient's knees. Clean linen was obtained, and, after cleansing the bowel and returning it to the abdominal cavity, the wound in the parietes was stitched up, the peritoneum being included with the skin. The incision was three and a half inches long and slightly S-shaped. It was dressed with 5 per cent. carbolic solution, fixed with strapping, and the abdomen was carefully bandaged. By the afternoon the patient was able to speak, and next day the history was taken. She had had seven children before, four without medical assistance, two with forceps, and one by craniotomy. Pains began between September 24th and 25th, ceased in the afternoon, and came on again on the 26th, when the midwife stated she felt the presenting head on vaginal examination. On September 27th, convulsions came on, according to the patient's account, accompanied by violent pain and abdominal distension, the movements of the child ceasing. To obtain relief, the patient determined to perform Caesarean section, of which she had heard. With a razor she slowly divided the skin; then made a second and a third incision; the child not yet appearing she made another cut which was followed by

a large jet of blood and exposed the placenta, which she removed. A foot came into view; by means of it, she pulled the child forth, the head offering considerable resistance. She divided the umbilical cord, laid the child, (which she believed to be dead) on the bed beside her, and threw the placenta on the floor. The bowels had not been moved nor the bladder evacuated since September 24th. Urine was passed on the afternoon of September 28th, but four further days elapsed before the bowels moved. The pulse was 120 the day after the operation; the temperature was never very high. The wound discharged freely, but was united by October 3rd. The patient made good progress and, making a good recovery, was soon back at work.

The most extraordinary case of all occurred on 28th March, 1886, so much so, that after an abstract had been published in the Lancet of that year, further enquiries were made, verifying the facts which are as follows (contained in a letter to the Lancet from the doctors in attendance) :-

"A peasant woman of Viterbo, aged 23, of lymphatic temperature, short stature (one metre and forty cent.), and of delicate constitution, was in the last month of pregnancy. As her condition was talked about amongst the neighbours, and provoked the anger of members of her family, and of her masters, she came to the following unheard of coffee and a cup of broth. She then left the

determination. At 3 a.m. on the 28th of March, as she relates, with a not very sharp kitchen knife, she opened her abdomen. The wound was linear, but somewhat jagged, twelve centimetres in length, situated in the middle of the right iliac region, from a little above the level of the umbilicus downwards, and from without inwards. She penetrated with a somewhat less extensive incision into the uterus and extracted from it a male foetus at the ninth month, weighing 1 kilogramme and 900 grammes. This foetus, before being extracted from the uterus, had received several important wounds in the thorax and abdomen, whereof it died before breathing, as was undoubtedly proved by the results of the microscopic analysis. The head had been divided from the trunk by a circular incision at the base of the neck, and precisely between the penultimate and the last cervical vertebra. The end was detached from the placenta and the foetus. The placenta was perfectly healthy. This operation completed, the patient states that she tightly bound a bandage round her body, so as to bring the edges of the wound together, and prevent the protusion of the intestinal coils; then, having dressed herself at 5 a.m., two hours after the operation, she went to Viterbo on foot, a distance of one kilometre, and visited a married sister, to whom she said nothing of what had happened, but breakfasted with her on bread and coffee and a cup of broth. She then left the

house, and walked about the town for some time, in order as she states, to show herself and put an end to the current talk about her pregnancy. At 10 o'clock, still on foot, she returned to her home in the country, on reaching it she was seized with unbearable abdominal pains, followed by violent vomiting and fainting. She quickly rallied, and, the bandage having slipped upwards, almost the whole of the small intestines protruded. It was only then (about 11 o'clock) that the father, mother, and brother became aware of the serious occurrence and went to Viterbo for medical assistance.

We were the first to arrive on the spot at 4 p.m. the same day, thirteen hours after the incision, and six hours after the escape of the intestines. We found the patient in pain, but not so much as might have been anticipated from the gravity of the case; she was conscious and tolerably calm. She was lying dressed in a small bed in a well-ventilated room. Without loss of time, with all possible precautions, and with the limited means at our disposal in the country, we proceeded to cleanse the intestines and to replace them in the abdominal cavity, after having emptied it of copious sero-sanguineous effusion. The wound was closed with twisted sutures, and a drainage tube placed in its most dependent part. Strict injunctions for necessary care were given to the patient and her attendant. During the first five days no serious change occurred. The thermometer

never rose beyond 39.5 C. There was no sign of uterine disturbance; the peritonitis was only partial; thirst slight; vomiting at night. During the first three days micturition was difficult and the bowels inactive. The catheter was only used once, on the third day, from which period the bowels acted copiously and regularly. The patient slept for several hours the previous night; her sufferings were not great, and on the eighth day her recovery seemed assured. At the commencement, abundant bloody serum and badly smelling clots escaped from the turgid and painful abdomen. A considerable quantity of omentum protruded. Pus followed, thin at first, but became thick on the tenth day and then gradually decreased in quantity. The discharge all took place through the lower angle of the wound, the deep parts of which healed by first intention for about two-thirds of its extent. On the twenty-fifth day the wound was purely superficial and limited to six centimetres in length. Cicatrisation was complete on the fortieth day. The patient is now (forty-eighth day) perfectly well and walks about. She is under the surveillance of the judicial authority and is receiving much sympathy from the public.

The occurrence, though seemingly incredible, is perfectly true. We have related the actual facts, accepting the patient's statement that she operated upon herself. What is even more extraordinary than the operation is the recovery in the proved circumstances

of the actual case. We shall be happy to supply any further information desired."

Raniero Baliva, M.D.  
Adolfo Serpieri, M.D.

P.S. "Actually we made use of a solution of carbolic acid 4 per cent., and of one per cent. for injection through the drainage tube which was removed the tenth day as it appeared to irritate. The sutures were removed on the fourteenth day. During the first fifteen days the dressings were changed four times daily. At first abstinence from food was strict. After a few days good wine was allowed. Throughout the treatment preparations of quinine were administered. Only two oil purgatives were given in the early days. Ice was freely used during the first five days to counteract hiccough and vomiting. Until recovery was complete the woman was covered with carbolised cotton wool."

It is a remarkable fact that six out of nine women recovered - 66 per cent. No special care or skill was exercised by them in operating; they were reckless and regardless of the consequences. Harris suggests it was due to the fact that "Their health had never been broken down by bone disease, either in the form of rickets in childhood, or malacosteon in adult life; and were in a physical condition to bear and recover from the shock of the operation."

These figures - small in number though they are - are in striking contrast to 100 deaths out of 160

Caesarean operations in the U.S.A. up to 1888, a recovery rate of 37.5 per cent., and 66 deaths out of 77 Caesarean operations in Britain up to 1865, a recovery rate of 14 per cent.

During the present century cases of self-performed Caesarean section have been recorded by Loffler (1901) and Patek (1913).

In the first of these, a 15 - para, suffering from severe pulmonary tuberculosis and osteomalasia, and believing herself about to die, at the end of pregnancy opened her abdomen with a rusty jagged knife. She saw the child fall from her body, fainted, recovered consciousness in a short time and called her daughter aged 13 to sew up the wound. This the child did by continuous suture employing a rusty needle and thread. The wound which was dressed with moss healed by "first intention", and mother and infant did well.

In Patek's case, a 19 year old girl was admitted to hospital with a self inflicted abdominal wound involving the uterus which contained a few remnants of placenta and membranes. The wound was repaired and after a stormy convalescence the patient recovered. The infant had been allowed to fall into a bucket of water on its extrusion from the abdomen and was drowned. At a subsequent pregnancy she laboured naturally.

Again, we have the sword in the hand of a soldier as possibly being the instrument to perform the first Caesarean section. History shows that this



weapon was certainly used after the taking of towns and cities in battle, to rip open the abdomens of 'women big with child'. Hazail of Damascus, King of Syria, who reigned a century before Rome was founded, or nearly 2,800 years ago, had this done to his Jewish captives by the soldiers under his command. This practice was very prevalent in the days when prisoners taken in the sacking of cities were at once massacred unless kept for slaves.

A number of cases are on record where women far advanced in pregnancy have had their abdomens ripped open by the horns of bulls, cows and other horned animals. The question of precedence must arise. Did a man or woman, or animal, make the first Caesarean section? The propensity of the bovine race to rip with horns was recognised by Moses 3,500 years ago, and special laws were made to deal with such accidents. The earliest known case occurred in 1647, and Harris (1887) collected nine cases where pregnant women were gored, with subsequent expulsion of a foetus through the wound, either immediately or after a short interval. Gould and Pyle (1897) mention three others.

On August 29th, 1647, the wife of a farmer at Zaandam, Holland, in her ninth month of pregnancy was tossed by a furious bull whilst trying to rescue her husband from its attentions. She "sustained an incision into the abdominal wall, which stretched from one ischium to the other, and through the pubic bone in the shape of a crescent." "She had another



wound through skin and peritoneum into the uterus, twelve finger breadths in length, from which the child issued." The placenta was also expelled through the wound. The child, apart from bruises in the upper lip and abdomen was uninjured and lived nine months. The mother succumbed to her injuries within 36 hours. There hung for many years, at the back of the choir of a church in Zaandam, a picture commemorative of this accident, but Harris, quoting from a letter from Prof. Halbertsma (1886) states it is no longer there.

Marsh (1867) cited the instance of a woman of forty-two, who in the eighth month of her ninth pregnancy was gored by a cow. Her clothes were not torn, but she felt that the child had slipped out and she caught it in her dress. Neighbours assisted her to her home, when it was found that the intestines were protruding through the wound. The umbilical cord had been severed at the time of the accident. A physician who saw her three quarters of an hour later found her in a state of collapse, although haemorrhage was not severe. The uterus was partly inverted through the wound and the placenta still attached. The uterine laceration was Y-shaped. The placenta was removed, the abdominal wound stitched and dressed, but the woman died one and a half hours after the receipt of her injuries. The child was unharmed.

Similar cases were reported by Fritse (1790)

from Germany (1779), by Harris (1887) from Spain (1785), France (1789), Italy (1805), by Thatcher (1850), from India and from Scotland, and from U.S.A. (1879) by Harris (1887). More recently Morse (1906) reported another. The child recovered but the mother died from Haemorrhage.

In Harris's collections six mothers out of nine recovered and five children were born alive. He also mentions three cases where pregnant women had their abdomens ripped open by horned animals, but without rupturing the uterus and a normal confinement followed at term. In conclusion he says "what more convincing argument can be produced to prove that the Caesarean operation is made as fatal as it is, by "meddlesome midwifery", than what I have shown to be the results in nine cases of cattle-horn laceration of the abdomen and uterus in pregnant women, when in the full possession of their usual health and strength?"

Two almost incredible stories of the Caesarean section may be described at this stage. Stalpart (quoted by Gould and Pyle) described the case of a woman who went to obtain water at a stream and whilst bending over was cut in two by a cannon ball. A passing soldier observed something moving in the water, which on investigation, proved to be a living child in its membranes. It lived for some time after. Farquaharson (1789) related the story of a Caesarean section, stated to have occurred "per se."

The patient was Elspeth Grant, of the parish of Arddach. In the month of April 1736, she was in continuous labour for three days "Till at length she split in the lower part of her belly, at which split or rent the child came into the world. The wound was anointed with butter and white sugar and healed itself." It is stated that there were various witnesses of this remarkable event, five in all, who made sworn statements confirming the truth of it. The midwife in attendance, one Anna Kennedy, depones "That she acted the part of midwife and was by her, the said Elspeth Grant, for the space of three days during her pains, which continued all the time, and that the child continued all that time in the birth till, in the end, the sick woman's belly split in the lower part thereof, towards the left side, with a squint downwards, at which the child came to the world; and that she, the deponent, took away the after-birth by the same split or rent. And that she depones that she knew the said rent to heal of itself without any sewing or medical application, except anointing it with butter and white sugar. And this is the truth as she shall answer to God." The remaining witnesses confirmed this statement. The manuscript reciting these events was found in 1786 by the Lord of Mackintosh. Enquiries made in the district showed that the event was well known and generally believed.

It would appear, therefore, that it is quite impossible to ascertain exactly when the operation of

Caesarean section was first performed, whether on a living woman or post-mortem. There is no doubt, however, that it is of great antiquity.

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The authentic history of the operation may be divided into three periods, firstly prior to 1500. During this time the operation was occasionally performed post-mortem in the hope of saving the child. Apart from the passages in the Talmud and the Mischnagoth, previously referred to, and concerning which learned Hebrew scholars in and out of the medical profession have held divergent views, there is no evidence to warrant the belief that the operation was performed upon a living woman, at any rate in European races.

The second period in the history of the operation extends from 1500 to 1876.

In the year 1500, the first operation of Caesarean section was performed on a living woman. 1876 marks the commencement of the development of the modern technique of the operation following the work of Porro and Sanger.

One day in the year 1500, the wife of a sow gelder, named Jacob Nufer, went into labour. For reasons not clear, she was quite unable to deliver herself of the child. Midwife ~~after~~ midwife was summoned until no fewer than thirteen had tried to help the unfortunate woman, but without result. Then to the astonishment of the neighbours, the husband sent for the local lithotomists, but however skilful these gentlemen may have been in

their chosen profession, they were of no assistance in the crisis and the child remained unborn. Not unnaturally the husband was now desperate and he asked permission from the local Mayor to perform Caesarean section. This was at first refused but was granted on a second application. Imploring divine aid, Jacob Nufer, using a razor, proceeded to perform a successful Caesarean section. The patient made a good recovery and in later years gave birth to five other children, including one set of twins, by the natural route. The child which had such a sensational start in life lived to the age of 77.

Considerable doubt has been thrown on the accuracy of this statement, one reason being that about 82 years elapsed between its performance and its account being published by Caspard Bauhin in the appendix to his Latin translation of Francis Rousset's book in 1582. Rousset, who was Physician to the Duke of Savoy published his book in 1581 and gave it the following title:- "Traité nouveau de l'hysterotomie ou Enfantement Caesarean qui est extraction de l'enfant par incision laterale de ventre et matrice de la femme grosse ne pouvant autrement accoucher, et ce sans prejudicer à la vie de l'un et de l'autre ni l'empêcher la fetondité maternelle par après."

The book was a masterpiece and he appears to be the first writer who had the courage to advise the performance of the operation upon a living woman.

The woman recovering. Finally he proved by

In the first part of his book, he pointed out the usefulness and necessity of the operation where there was imminent danger to both mother and child in cases where delivery by the natural passage is impossible. Next he established the possibility of the success of the operation by instances of various kinds which proved that wounds of the parts to be divided during the operation are not necessarily fatal. Lastly, he entered into a detailed account of several obstetrical complications which were incomparably more terrible than the operation he proposed and which, for the most part, may be avoided by its performance.

These complications he described under five classes. In the first, he referred to women who, being pregnant and the child dying and becoming decomposed, an infection in the uterus is set up, so severe, as to cause the death of the mother, an outcome which could be prevented by performance of Caesarean section. In the second class, he gave histories of cases of abscess of the uterus where successful incision was made by means of cautery. Thirdly, he mentioned cases of "ulcers" where the child had escaped into the abdominal cavity and given rise to an abscess in the hypogastrium. Such an abscess was opened without danger to the mother. Fourthly, he spoke of several amputations of the uterus by means of ligature, cautery, or the knife, the woman recovering. Finally he proved by

several examples that a further pregnancy may follow the operation.

In the second part of his book Rousset sought to establish the successful outcome of the operation by giving an account of a number of cases communicated to him by "men of veracity" and also one in which he recommended its performance.

These cases were seven in number. The first of these concerned a woman named Anne Goddard on whom the operation was successfully performed on six occasions by a surgeon named Guillet. She became pregnant a seventh time, but Guillet having died in the meantime, and no other surgeon undertaking to operate, she died. The second case was that of a woman operated upon three times at Merenville by two surgeons by name Ambroise le Noir and Gilles le Brun. Rousset was anxious to see this woman but, when he went to do so, found that she had, in the meantime, died from the plague which had ravished the town in which she lived. The third case was related in a letter written by one Alibour, a Physician at Sens, in which he stated that Jean Desmarias, a Surgeon of Berry, had performed the operation upon his own wife and that, in later years, she was delivered naturally of a daughter. The fourth case was merely the recital of a similar operation told to Rousset by Laurence Colot, a famous lithotomist of Paris, who received his information from M. Pelion,

a physician at Angiers. The fifth case referred to an operation which was quite as successful as the first four. In the sixth case he described how, along with Dennis Armentant, a Physician at Gian, he examined a woman who had a ventral hernia and a long scar on the right side of the abdomen which, she declared, was the result of an operation done seven years previously in order to deliver her of her child, such child then being alive and well. In the last case he described how, in 1556, he advised the performance of the operation on a woman who had been in labour for four days. This was carried out by a surgeon called Lucas. The incision was made on the right side of the abdomen and five stitches were inserted in the abdominal wound. Eighteen months later, the patient's husband died. She married again and was afterwards delivered of a daughter following a normal labour.

Two years before publication of Rousset's book, Ambroise Pare (1510-90) gave to the world his book on surgery (1579). In it he strongly criticised the Caesarean operation. In the English translation of his work (1678) we find the following passage:- "But I cannot sufficiently marvel at the insolency of those that affirm that they have seen women whose bellies and womb have been more than once cut, and the infant taken out, when it could not otherwise be gotten forth; which

thing no man can persuade me can be done without the death of the mother, by reason of the necessary greatness of the wound that must be made on the muscles of the belly and substance of the womb; for the womb of a woman that is great with child, by reason that it swelleth and is distended with much blood, must needs yield a great flux of blood, which of necessity must be mortal. And to conclude, when that the womb or the incision of the womb is cicatrised, it will not permit or suffer the womb to be dilated or extended to receive or bear a new birth. For these and such like other causes, this kind of case, as desperate and dangerous, is not (in my opinion) to be used."

He also mentions, however, that an account of a successful case had been communicated to him. He said, "I have, however, been assured that Maitre Vincent, a surgeon of Hericy near Fontainebleau, performed this operation with happy success. Both this woman and the surgeon are still alive. As many persons of honour have related the fact to me and even affirmed that they saw him perform the operation and extract the infant, I cannot call their veracity into question but must look upon the thing as a true miracle of nature." This operation mentioned by Pare was related by Schenkus in a more circumstantial manner. He said that the woman's name was Nicole Beranger and the date of the operation was 1542; he added that the child was in a putrid state and that the incision



was made on the left side of the abdomen. Five stitches were inserted in the abdominal wound. Rather unexpectedly, the patient recovered although she was left with a large ventral hernia. The patient gave birth to two children in later years, by the natural route.

It would appear, however, that Pare was not always so great an opponent of the Caesarean operation because in the first edition of Rousset's book we find an "Approbation" by De Monanteuil, Professor of Mathematics and Dean of the Faculty of Medicine of the University of Paris in which that physician extolls Rousset's work and immediately below this Approbation we read the following words:- "J'atteste ce que dessus: AMBROISE PARE". Further, from the writings of Jacques Guillemeau, one of Pare's pupils, it would appear that he (Pare) had twice seen the operation done but both patients died. Francois Mauriceau (1637 - 1709) said this was "because he will not have posterity know that he was able to consent to so great a cruelty."

In 1582, Rousset's work was translated into Latin by Caspard Bauhin under the title, "Exectio foetus vivi exmatre viva sine alterutrius vitae periculo et absque faecunditatis ablatione a Franciso Rosseto Gallicae conscripta a Gasp. Bauhino latine reddita et variis historiis aucta." Basil 1582.

To this he added several cases of his own collecting, including that of Jacob Nufer above related. His observations were obtained mostly from Mm. Albosius and Sagueyerus. Others were extracted from the work of Mauritius Cordaeus and Felix Plater. At the end of his translation, Bauhin mentions the case of a woman called Elizabeth Turgois, who underwent a successful Caesarean operation and was later delivered of four children by the normal route.

In 1590 Rousset published an apologetic dialogue on the Caesarean operation entitled, "Dialogus Apologeticus pro Caesareo partu in malevoli cujusdam Pseudoprotei dicteria, Paris 1590." In his work he considered all the objections which had been made by his adversaries and even took it upon himself to expose them in their proper light which gave him occasion to enlighten and fortify his own way of thinking. Of this work Simon, writing in 1750 said, "Nothing appears more simple and solid than his reasoning concerning the necessity of the Caesarean operation. Nothing is more clear and accurate than the instructions he gives. He describes this operation with the greatest perspicacity and in its favour relates the reasons most capable of inspiring courage to perform it. In a word, Rousset, possessed with all the confidence arising from a good cause, and of the sentiments of a man animated with a love of public good, neglects

and insulting to Rousset. The book was written in

nothing capable of either bringing this operation into repute or encouraging surgeons to the performance of it."

One of Rousset's greatest critics was a M. Marchant, a surgeon of Paris. In answer to the dialogue, he published a work entitled "In Francisci Rosséti Apologiam Jacobi Marchant, Regis et Parisiensis Chirurgi Declamatio." In the first part of this work he disputes Rousset's assertion that the Caesarean operation is required under certain circumstances. He considered that the evidence given in Rousset's sixth case was totally inadequate to prove that the patient had undergone the Caesarean operation. "How many cicatrixes" he declared, "do we see of accidental wounds and abscesses of the abdomen which might lay a foundation for making us believe that they are the consequences of the Caesarean operation. Skilful surgeons, always zealous for the public good and relief of the afflicted, have eagerly embraced your new system and want to be confirmed of its truth." Marchant contended that there was no case which could not be delivered by a skilful surgeon by the natural passages and without recourse to the Caesarean operation which, according to his way of thinking, always ended fatally. In the second part of his book, Marchant, warming to his task, abandoned logical reasoning and became abusive and insulting to Rousset. The book concluded with

several satirical poems addressed to Rousset in which the criticisms are far from being what we might expect from a man of letters which Marchant undoubtedly was.

Jacques Guillemeau (1550 - 1613), who was surgeon to Henry IV and a very celebrated obstetrician at the end of the 16th century, also endeavoured to persuade Rousset, but without success, that his advice and practice was not a wise one. Following the satires of Marchant, there is a letter addressed to Rousset by Guillemeau in which he gives his reasons for opposing the Caesarean section. This letter was written in a much milder tone than the satires of Marchant and is more in the nature of a gentle reproof from one friend to another.

It is evident that these disputes were both in favour<sup>of</sup> and against the operation. It must be pointed out that nearly all Rousset's cases were the results of evidence obtained in conversation and correspondence. He himself does not appear ever to have performed the operation. The fact that several of the women afterwards laboured naturally would make it appear that the operation, in some of the cases, at least, was performed unnecessarily. Rousset's writings, whether their authenticity is or is not admitted, had certainly one great merit in that they brought the attention of the medical profession to the operation and suggested the possibility of its

performance upon the living woman.

In 1590, Rousset, after further researches in reference to the operation, published a larger edition of his book, printed in Latin and entitled, "Caesarei partus assertio Historiolog." He extended his arguments in favour of the operation and gave an account of five further successful cases. Two of these patients afterwards had normal deliveries. In the fifth case, which occurred in 1582, it appears that the operator, one John Lucas, was anything but sober at the time of the operation. Rousset, in this connection remarked "And if the operation succeed with him when drunk, what may not he expect who perform it when sober, according to the justest rules of his art?".

Guillimeau, who published his book, "Childbirth or the Happy Delivery of Woman" in 1598, and which was translated into English by Thomas Hatfield in 1612, devotes a chapter to the subject. After referring to the performance of the operation after the death of the woman, he gives his views regarding the operation on the living subject. He had not altered them from his previous letter. He said, "Some hold that this Caesarean section may and ought to be practised (the woman being alive) in a painful and troublesome birth: which for mine own part, I will not counsell any one to do, having twice made trial of it myself in the presence of Mons. Paraeus and likewise seen it done

by Mons. Viart, Brunet, and Charbonnet, all excellent Chirurgeons and men of great experience and practize: who omitted nothing to do it artificially and methodically: Nevertheless of five women in whom this has been practized, not one hath escaped. I know that it may be alleged that there be some have been saved thereby: but though it should happen so, yet ought we rather to advise it than either practize or undertake it: for one swallow makes not a Spring, nor upon one experiment only can one build a science."

"After Mons. Paraeus had caused us to make trial of it and seen that the success was verie lamentable and unfortunate; he left of and disallowed this kind of practize together with the whole Colledge of Chirurgeons of Paris; as likewise the discreeter sort of the Regent Doctours in the facultie of Physicke at Paris; at such time as this question was sufficiently discussed by the late Mons. Marchant in two declarations he made when he had the honour to be admitted sworne Chirurgeon of Paris."

The textbooks of Pare and Guillemeau are the first obstetrical works in which we find (mention of) the performance of the Caesarean section on the living subject discussed.

The subject is not mentioned in that famous early work, "The Byrth of Mankynde" (1540) nor in the "Childbearers' Cabinet" (1653). It is remarkable that such a man as Pare did not admit in his writings that

he had seen the operation done on two occasions both with fatal results. Mauriceau's remarks in this connection would, therefore, appear to have some justification. Guille<sup>c</sup>meau apparently did not believe Rousset although his attitude would appear to be uncertain, he not caring to undertake the operation but being willing, in certain circumstances, to advise it!

In 1604, Scipio Mercurio (1540 - 1616) a surgeon of Padua, published a work entitled "La Commare Riccoglitrice" in which he related successful cases of Caesarean section and advised that it should never be neglected in cases in which the delivery is otherwise impossible.

In his book he devoted two chapters to Caesarean section saying "When the foetus is extraordinarily strong, the passage narrow, the pubic bone flat, it is more than necessary to perform this operation because there is no other way out." He appears to have been the first to advise the operation in cases of contracted pelvis. Mercurio spent a considerable part of his life in monasteries and he is to be admired for his courage in braving the opposition of the church, and the risks of abdominal surgery in the absence of anaesthetics and antiseptics.

He stressed that the surgeon who would undertake the operation must have a sufficient knowledge of the anatomy of the parts and advised that the operation



should only be performed if the patient appeared sufficiently strong to undergo such an ordeal. He related that, being in a place called Chateauneuf, near Toulouse, he saw two patients who had undergone the operation, with successful results. He made the rather remarkable statement that, in his day, this operation was almost as common in France as bleeding was in Italy for headaches!

Hendrik van Roonhuyze, a surgeon of Amsterdam, was one of the earlier champions of Caesarean section, which he seems to have performed several times with success. He also made the statement in his work: "Libro Obserb.de morbis mulier;" that a physician of Bruges, by name of Sonnius, had performed the operation seven times upon his own wife. Roonhuyze is known for his great work "Heelkinstige Aanmerkkingen" (1663) which has been described as the first work in operative gynaecology in the modern sense. It was illustrated with unique copper plates showing the mode of incision in Caesarean section and certain case reports on extra-uterine pregnancy and rupture of the uterus. According to Fasbender, it was his son, Roger van Roonhuyze, to whom the elder Hugh Chamberlen sold his secret of his obstetric forceps about 1663.

Another who had the courage to perform the operation upon his own wife was a noted Swedish physician called Olaus Rudbeck while Thomas Bartholini related in his Hist.Anat.Cent. that he

knew of a woman in Paris upon whom the operation had been performed no fewer than five times. The dates of these operations are unknown.

In 1637, Theophilus Raynaud published a book on the subject entitled "De ortu infantium contra naturam per sectionem Caesarean." He described three successful cases. In the first, he related the testimony of the famous surgeon, Louis Panthot, who assured him that in the month of April 1727, a woman near Lyons, after having suffered labour pains of great intensity for several days, was happily delivered by Caesarean section, both mother and child being preserved. The second case was one in which the woman had three times undergone the operation. The third was taken from a letter from Pillaire, in which it was stated that the operation was performed successfully on six occasions, on a woman at Aucois.

The first definitely authentic case of Caesarean section intentionally performed upon a living woman was carried out on April 21st, 1610, by Trautmann of Wittenberg as recorded by Professor Sennert of that University, who was himself present at the operation. "The gracious help of God was first of all implored - in addition to the surgeon, there were present the Archdeacon, two midwives, and several other honourable women." The time was eight in the morning. The incision of the abdominal wall is not referred to, but it is noted that the incision of the uterine wall was not very painful

and was in a vertical direction. "In fact, as soon as a way was opened the child itself, which thanks and glory be to God, was healthy and unhurt, as it were, by its own exertions sought the outlet." The uterus was left protruding from the wound and was unsutured; it became purulent - as did the edge of the wound - and led to sudden death on May 16th, twenty five days after the operation. The reason given for its performance was that the patient had a large hernia which contained the gravid uterus, delivery per vias naturales being impossible.

It is impossible to proceed further without taking notice of the work of Francois Mauriceau (1637 - 1709), the foremost of the French obstetricians of the seventeenth century. In 1668 he first published his book, "The diseases of women with child and in child bed." It was by far the best book of its kind so far published. On the title page (of the English Edition) it is described as "A work much more perfect than any now extant and very necessary to all, especially midwives and men practising that Art." The work was illustrated with exquisite copper plates and was a sort of canon of art in its time, giving a good account of the conduct of normal labour, the employment of version and the management of placenta praevia. Many improvements were effected in subsequent editions and a translation into English was made by Hugh Chamberlen and published

in 1672. Mauriceau was a determined opponent of Caesarean section and asserted that "that which Rousset reports of the Caesarean section is nothing but the ravings, capriciousness and imposture of their authors." In his book we find the following passage:- "When a big-bellied woman is effectively in labour, 'tis very rare but that an expert chirurgeon can deliver the child, dead or alive, whole or in pieces: in a word that he may do the work completely or if he behaves himself as the case requires and according to the direction given in each particular chapter foregoing, treating of the several unnatural labours, without being necessitated in a very inhuman, cruel, and barbarous manner to have recourse to the Caesarean operation during the mother's life, as some authors have too inconsiderably ordered and sometimes practised themselves."

About this time, the excuse sometimes given for the performance of the operation was that the child must, at all cost, receive baptism. Mauriceau replied, "I do not know that there was ever any law, Christian or Civil, which doth ordain the martyring and killing the mother to save the child." He referred to the performance of the operation for the purpose of securing an heir as "Damnable policy". He congratulated Guillemeau for writing in the terms in which he did and attacked Pare, as we have already seen. He



effectively disposed of the arguments of those who maintain that recovery after the operation is not impossible because they have seen dead children "come forth by an abscess of the belly" pointing out the difference between such a gradual procedure and the making of "at one great stroke, a very great wound in the belly."

He described the case of a woman admitted to the Hotel de Dieu who insisted that her previous child had been born by the abdominal route, showing a great scar to prove the accuracy of her statement. This was rapidly proved wrong when it was found that the scar was situated on the right side of the breast!

Mauriceau, however, agreed with the performance of the operation immediately after the death of the mother and gave a careful account of the method of carrying it out. He was the greatest obstetrician of the seventeenth century and his writing must have impeded the progress and development of the operation. Had Rousset been alive, he would no doubt have asked Mauriceau for an explanation of his conduct of a case related in his twentysixth observation in which a woman was permitted to die undelivered when she might have been saved by Caesarean section.

During the last decade of the 17th century several further successful cases were related. In 1692, Saviard published in the Journal des Scavants, the case of a dressing he had applied for

a ventral hernia following an incision for Caesarean section made fourteen years previously. The patient finally died and at the post-mortem examination, a cicatrix was found in the uterus occupying its whole thickness and corresponding to the incision in the abdominal wall. This author added that the surgeon who performed the operation was obliged to leave on account of the treatment he received from the patient's relatives. It would appear, however, that Saviard did not know the real motive of the flight because in the same Journal of June 1693, it was stated that being a Calvinist, he had considered it advisable to leave hurriedly, as many other Protestants had done on account of the trouble which was preparing against those who had adopted the reformed religion.

In the same Journal of the eighth of June of the following year, M. Jobert, a physician of Chateau Tierri, not only confirmed M. Saviard's case, but related that another woman of the same town, who was still living, had twice undergone the operation at twenty month's distance: that the child taken out by the first incision was still alive and about 10 years old; that there was to be seen, on its lower jaw, the scar of a wound made by the operator and that Messieurs Beyne and Bouvet were the persons who performed the operation. The second operation was made by M. Bouvet alone, his colleague having died in the meantime. After the second operation the



mother's convalescence was more prolonged - "she got well with somewhat more difficulty than the first time." The child was dead, having been "suffocated in the waters which had spread themselves in the uterus."

An account of another successful case was related in "Acta erudit Lips. ann. 1693." The woman, at a previous labour, had had a very difficult delivery performed by a midwife, which was followed by the development of a vesico-vaginal fistula. To obtain relief, she resorted to various quacks, but the only result was the production of large tumours in the vagina. In spite of this, a further pregnancy occurred. When labour commenced she was attended by a physician named Lankish who advised Caesarean section. As far as the mother was concerned, this was successful, but the fate of the child was not stated. In his "Dissert du partu Caesaru (1695)", Vater mentions a similar operation which appeared to be equally successful. Labour was obstructed by a large vegetating mass following an ulcer (probably malignant).

During the period under review, and indeed for many years to come, the technique of the operation was extremely crude. Anaesthetics were, of course, unknown and the patient was held down in the strong grip of assistants. Many of them had already suffered so much in the way of pain from prolonged uterine contractions and futile manipulations that



probably their sufferings were not so much worsened. The abdomen was divided with a bistoury, the incision being made in the right or left semilunar line, most often the latter, sometimes in a straight line, sometimes slightly oblique or of crescentic shape but always immediately outside the rectus muscle. This is probably the origin of the popular fallacy, which persists to this day, that in Caesarean section, the child is taken out of the mother's side. The advantage claimed for the incision in the position mentioned was that the danger of wounding the bladder was lessened. It was also recommended that the incision be made on that side to which the uterus rotated. The uterus was opened, generally by the longitudinal incision, the child and placenta extracted while assistants did their best with their hands to prevent protrusion of the intestines. At this stage, Rousset advised washing out the uterus with an infusion of herbs and he also recommended the insertion of a cannula into the neck of the uterus in order to ensure free drainage for the lochia. The uterine wound was not stitched but left gaping and the edges of the abdominal wall were approximated with a few crude stitches and with sticking plaster.

According to the tables of Churchill, there were 24 successful cases in the sixteenth century and 33 during the seventeenth but only eight fatal cases up to 1741! It is hard to believe that

the mortality from the operation was so low and the obvious conclusion, considering the crudeness of the technique, lack of anaesthetics and absence of antiseptic precautions, is that while most, probably all, successful cases were reported far and wide, much less (or nothing at all) was mentioned of fatalities. There must also have been good reason for the violent opposition to the operation of so many of the leading obstetricians.

Coming to the eighteenth century, there was published in 1704 by Ruleau, a surgeon of Saintes, a dissertation, entitled "Traite de l'operation Césarienne" on the possibility and necessity of the operation. He brought forward nearly all the reasons given by Rousset and also described a successful operation performed by himself. The patient had been in labour for five days and vaginal examination revealed a pelvis distorted to such a degree that two fingers could hardly be inserted. At operation the haemorrhage was but slight and both mother and child were preserved.

In 1718 M.Dionis, "first surgeon to the late Dauphiness" and "Sworn master surgeon of Paris" published a work on obstetrics entitled "A general treatise of midwifery" which was translated in English the following year. He too, was an opponent of the performance of the operation on the living, remarking "The operation is by no means to be performed till the woman is dead; and that those

who are so bold as to venture upon it while she is alive, deserve to be severely punished for butchering of her after this manner."

From about this time onwards obstetric works appeared in ever increasing frequency as the entry of the doctor into obstetric practice increased. This is usually held to date from about 1663 when Louis XIV, in order to preserve secrecy, sent for the Court surgeon, Jules Clement, to deliver Mlle. de la Valliere.

Caesarean section came to be performed in slowly increasing frequency and accounts of successful cases came to be given in great detail. While such are of great interest, the remarks and directions of the leading obstetricians of the time are perhaps even more so.

Continuing with the French writers, to whom we are indebted for our early information, we find a modification of the prevailing opinion is given by Guillaume de la Motte (1656 - 1737), the leading French obstetrician of his day. He published his book in 1721 and it was subsequently translated into English by Thomas Tomkyns in 1746. He wrote, guardedly it must be admitted, in favour of the performance of the operation, saying, "this operation may have been performed with success several times but few examples of it are come down to our knowledge, yet those few are sufficient to warrant our undertaking it when necessary."

After referring to the successful cases, related in the Journal des Scavans of 1692 and 1693 he refers to the work of Ruleau (1704) saying that "He (Ruleau) proved first before several physicians and surgeons that the confirmation of the bones was such that he could but just introduce two fingers which made delivery impossible in the usual way." The words "before several physicians and surgeons" are of great interest. In many of the subsequent case records, we shall find that, recognising the hazardous nature of the operation, a great number of surgeons were called into consultation, before the operation was finally decided upon. Ruleau's case appears to have been the first in which such action was taken and while of itself, it is commendable, it must have entailed much loss of time, not to mention further risk of infection by repeated examination.

De la Motte then asked - "Who after these examples can reject the Caesarean operation as not admitted of success? Have we not seen women escape in worse cases? What greater danger is there in this operation than in the high operation for the stone? The abdomen is both opened in the same place, indeed in one the incision is longer but this can be of no consequence and there is surely as much danger in opening the bladder in its fundus as the uterus in its body." The only indication of the operation which he admitted was extreme

distortion of the pelvis. "The os sacrum, ischium and pubis being from their first confirmation so close to one another that the surgeon can hardly introduce a few fingers between them, it being consequently impossible for the child to come through, is the only case where this operation is to be put into practice." "There are some others which seem also to call for it but which may be remedied by other means" notably scarring of the vulva and vagina resulting from injury at previous confinement, or as the result of a burn.

In his observations he gives an account of a case which occurred in 1704. In dealing with a shoulder presentation, the midwife pulled off the presenting arm; a neighbouring surgeon who was summoned performed Caesarean section through a crescentic incision from umbilicus to pubis. The patient developed a faecal fistula but in five weeks the woman was able to be up, the wounds having healed. A remarkable feature of this case was that during subsequent menstrual periods, blood is stated to have discharged through the scar although there was no visible opening in it. The patient was also left with an enormous ventral hernia.

The writer went on to describe several cases in which although Caesarean section appeared to be indicated according to some, he dealt with successfully by other means. This was especially where

the soft parts had become greatly contracted from previous injury. He also stressed the necessity of ascertaining whether or not the child is alive when it "sticks in the passage" before performing the operation, and quotes four cases to prove how difficult this may be.

In the first of these, the child was born alive although it had shown no signs of life for several days previously. He said "It was fortunate for the child that he had to do with no crochet man, and for the mother with no Caesarean operator." The second was a similar case, while in the third, the position was reversed, a macerated foetus being born although the mother had insisted that she could feel movements right up to the time of delivery. The fourth case was a hydrocephalic.

The first Caesarean section in Great Britain was performed on 29th June, 1737, by Mr. Smith, a surgeon of Edinburgh. He was summoned to see the patient the previous night and learned that she had been in labour for six days. She was "prodigiously deformed" and was found to have marked distortion of the pelvis. A sedative was ordered and next morning the os uteri was found dilated to the size of half a crown. Mr. Smith concluded that delivery by the natural passages was impossible, even with the aid of the crochet. His opinion was confirmed by two of his colleagues, Dr. John Permont and Mr. Drummond. Caesarean

section was, therefore, suggested, the woman and her relatives consenting although the great dangers attaching to it were impressed upon them. Mr. Smith operated at 10' o'clock the same night in the presence of seven other surgeons. The abdominal incision was first marked out with ink, six inches long, parallel to the linea alba and four inches distant from it. After it had been effected with the scalpel, down to the muscles, a short incision through the muscles and peritoneum was made with the scalpel and enlarged, equal to the incision in the skin and fat, with crooked scissors. The uterus was opened and the membranes ruptured; as the child was large it was found necessary to enlarge both the uterine and the abdominal incisions. The child was then removed, dead, and afterwards the placenta and membranes. Some coagulated blood in the uterus was removed and the abdominal wound stitched, after reducing some coils of intestine which protruded through the wound, soft pledgets, a large compress and a napkin being used as a dressing. Haemorrhage appears to have been slight-"she did not lose above four or five ounces of blood during the operation." The patient died at 4 p.m. the following day, eighteen hours after the operation. (McClintock 1878).

Hull (1799) mentions a case of Caesarean section by Dr. White of Manchester, "before 1740". The woman was a native of Rochdale but beyond the



fact that both mother and child perished, no details are known. The father of Charles White (1728 - 1813), so well known for his works in connection with the prevention of puerperal fever, was a medical man in Manchester about this time and it is possible he may have been the surgeon in question.

The first successful case of Caesarean section in Great Britain was performed by a midwife in January 1738. The patient was Alice O'Neale, aged 33, a farmer's wife of Charlemont, Ireland, who had already borne several children. She had been in labour for 12 days and various midwives had attempted to effect delivery but without success. The child was thought to be dead after the third day. Mary Donally, an illiterate woman but "eminent among the common people for extracting dead births", tried, but without success, to deliver the poor woman. She, therefore, performed the Caesarean operation by cutting with a razor, first the abdominal wall and then the uterus, at which opening she removed the child, placenta and membranes. The incision commenced one inch above and to the right of the umbilicus continuing downwards for six inches "in the middle twixt right os ilium and linea alba." She held the lips of the wound together with her hands while the neighbours went a mile and fetched silk and a tailor's needle with which the abdominal wound was

stitched up. The wound was dressed with the white of an egg and the woman made a good recovery and was able to walk a mile on foot on the twenty-seventh day following the operation. Like many others, she subsequently developed a large ventral hernia. (Stewart 1771).

King (1771) reported having seen a woman in 1740 on whom a midwife performed a similar operation about two years before and said that he removed the needles which the midwife had used to keep the lips of the wound together. The midwife assured him that the pregnancy was not extra-uterine as a leg had been seen in the vagina prior to the operation. It is highly probably, however, that both accounts refer to the same patient.

The first British author to notice the operation at any length was Sir Fielding Ould (1710 - 89). Of the earlier writers, William Harvey (1578 - 1657) renowned for his discovery of the circulation of the blood (1616), approved only of the performance of the operation after the death of the mother. Percival Willoughby (1596 - 1685) whose work "Observations in Midwifery" was first published in 1863 from a manuscript now in the library of the Royal Society of Medicine, wrote that "Caesarean section hath proved unprofitable to several in whose hands the women have perished and it is not used in England, I therefore pass it over in silence." Sir Richard Manningham

(1690 - 1759) whose chief work was the "Compendium Artes Obstetricaræ" published in Latin in 1739 and 1740, considered the operation always fatal to the mother and only to be performed after her death.

Ould, in his "Treatise of Midwifery" published in 1742, and reprinted in 1748, unhesitatingly condemned the operation. In his preface he said, "I have taken upon me absolutely to explode the Caesarean operation as repugnant not only to all rules of Theory and Practice but even of humanity" and later in his work endeavoured to prove the improbability and even impossibility of its success from its analogy with other wounds. He was at great pains to invalidate the authority of Bauhin, Rousset, de la Motte and other supporters of the operation by denying the evidence which they produced in its favour. He hoped none of the cases would be credited by readers "of this age". He considered these histories as "fable and impos<sup>e</sup>ure" and said "for from Theory, Anatomy and everything consistent with surgery, the Caesarean operation is certainly mortal and I hope it will never be in the power of anyone to prove it by experience." He described the operation as a "destestable, barbarous, illegal piece of inhumanity." The closing paragraph in his chapter on the subject is worth quoting in full. "There may certainly one case happen where the mother and child may

perish, if the latter be not reduced by the Caesarean operation; namely when the pubes and sacrum are so preter-naturally near each other that the operator's hand cannot pass between them, in order to come at the child. And even in this case, I do not know that we have authority to destroy the mother, although it might save the child; this deplorable dilemma should certainly be cleared up by the Divines."

But Ould knew - and he admitted it in his preface - that this and the other question relating to Caesarean section, had been considered by the "Divines." Such knowledge ought to have led him to modify his remarks. The Doctors of Theology of the University of Paris made a report on this question dated from the Sorbonne, March 30th, 1733, in reply to a questionnaire presented by the medical profession. They asked, whether in a case where the woman could not be delivered by the natural passages, it was preferable to sacrifice the mother for the sake of the child by exposing her to the risk of the Caesarean operation or should the child be mutilated, in order to ensure the safety of the mother by delivering her by the usual route.

The medical men reassured the theologists by saying that such cases were very rare and could be divided into three classes; the first, contraction of the birth canal, either of the pelvis itself or of the soft parts by malignant disease; the second

where the child is unusually large from such a cause as hydrops, although the pelvis of the mother is normal; and the third where the head of the child has become fixed in the pelvis with malposition of the uterus and it is impossible to dislodge it without fracturing the cranium.

The theologists in reply, considered it necessary to draw attention to the following points:-

- (1) Should one make use of the Caesarean operation to save the mother or child when one has a hope of saving one or the other by this means?.
- (2) Should one perform the operation at the expense of the mother when the safety of the child seems assured?.
- (3) When the loss of both mother and child seems certain, should one do the operation in the hope of saving the one or the other?.
- (4) Lastly, if one is only able to save either the mother or the child by means of Caesarean operation, which of the two should one save?.

The reply to question one was in the affirmative, the theologists replying on the successful reports of Rousset, Bauhin and others. The Council's answer to the second question was that if the operation was likely to cause certain death

to the mother, and if such a result was anticipated, it must not be carried out. They declared that it was not permitted, according to the doctrine of the Apostles, to do evil out of which good might come, however desirable it might be to procure baptism of the infant. "Only God who has given life, can take it away, and there is no pretext which can authorise one to commit homicide in order to realise a greater good." Not even the consent of the mother could authorise the operation. The Council answered the third question by supposing on the one hand the certainty of the mother's death as well as the infant's, if the Caesarean operation was not done and the uncertainty of success if it was performed. In such a desperate case, Caesarean section was permitted even although the hope of its success was but slight. To answer the fourth question the Council replied that regard must be had on the one hand to justice, and on the other to charity. Taking the side of justice, one would sacrifice the life of the child to save the mother, but charity demanded that the mother preferred the safety of her child to her own life, since, only at the expense of her own life, could baptism of the child be assured. The majority of theologians taught this doctrine which was supported by S. Thomas and Cabassutius (Deventer 1734).

A notable contribution to the cause of Caesarean section was made about this time by

M. Simon, a French surgeon. Following the communication to the Academie Royale de Chirurgie of several successful cases, he made an inquiry into the subject (Neale 1750). He considered that the operation should be performed where delivery through the natural passages was impossible, besides approving of its performance after the mother's death. He said, "I propose, in this memoir, to show that on such occasions, greater advantages are to be reaped from it than when it is performed in the first case, (postmortem): for when it is performed after the mother's death it is not only useless to her but also for the most part to the child: whereas, I shall prove by a great many instances, that this operation performed in the second case (on a living woman) has preserved the lives of a great many mothers and children."

After a review of Rousset's work and the various disputes following, he remarked, "It is not sufficient that some observations evince the success of so terrible an operation. It is necessary that a more regular trait of experience should ascertain to what degree this operation is safe or dangerous in order to admit or reject it."

He described eleven further successful cases. The first of these concerned a Madame Gourdain on whom the operation was performed after a midwife and a surgeon had tried all means in their power to deliver by the normal passages. At this stage the



the patient, who had already been in labour for three days, begged for the operation. She believed that women of quality were delivered in this manner. The surgeon, not unnaturally, was astonished by this request and at first refused to carry it out as he had never heard of it. However, pressed by the entreaties of the patient and her husband, he finally consented. The operation was carried out through a longitudinal incision three fingers breadth from the umbilicus, the husband acting as assistant. The child was dead. The patient made a good recovery and in later years gave birth to four other children in the natural way but three of these were still born. She appeared before the Academie Royale in 1739 for examination.

The next two cases were related by De la Peyronie and concerned two operations on the same patient carried out by a surgeon named l'Amiral. Three others by a M.de Thise were reported by Urban. The first of these had subsequent normal delivery. The seventh case was remarkable for the enormous ventral hernia which ensued in later years. It was found by De la Faye to be thirteen inches long by ten broad. M. Noyer was the operator in the next. His patient had had three previous normal deliveries prior to 1726 which was the year in which the event occurred. Unfortunately for the patient, M. Noyer died before her next labour and no one being found who would

venture to operate, she died undelivered.

In 1723 a courageous midwife, named Mme.Flandrin performed a successful operation on a primipara aged fortyeight after efforts by her to deliver with a crochet had failed. Simon's tenth case concerned the wife of a physician of Spa, Dr. de Presseux. Labour being prolonged, he himself examined his wife, and found a breech presentation. A surgeon, M. de Bliesse of Liege, was summoned and the two men worked for eighteen hours in an endeavour to save the child. This failing, and the infant now being dead, de Bliesse proposed Caesarean section; with some hesitation, the husband consented. The patient recovered after a stormy convalescence and two years after the operation which took place in 1738, she was happily delivered, normally, of a female child. The last case in Simon's collection related to a dwarf who was only 37 inches in height and had marked distortion of the pelvis. The medical attendant, Dr.Soumain of Paris, consulted nine other eminent obstetricians of Paris and all were agreed that in Caesarean section, there lay the only hope for the poor woman who had already been in labour for three days, the child presenting by the shoulder. The mother made a good recovery and went to Church on the forty-seventh day. The infant died the day after the operation, apparently from neglect.

The beginning of the second half of the

eighteenth century is noteworthy for the publication of two more books on obstetrics by British writers.

The first of these appeared in 1751 by John Burton, antiquary and man-midwife, who was born at Colchester in 1710. It was he who was satirized by Laurence Sterne in "Tristram Shandy" under the name of Dr. Slop. In his book entitled "An essay towards a Complete New System of Midwifery, Theoretical and Practical, together with several new improvements whereby women may be delivered in the most dangerous cases with more ease, safety and expedition than by any other method hitherto practised." John Burton entered into much more minute details concerning Caesarean section than any of his predecessors, some of whom, such as Giffard(1734), Chapman (1733), and Exton (1751) did not even mention it. After a brief historical review, he considered the indications of the operation under two headings, according to whether the foetus was dead or alive. In the first class, he advised the operation where the foetus was incapable of being extracted by the natural passages owing to distortion of the pelvis or "where coalition, callosity, or schirrus of the mouth of the womb or vagina is so large and hard as to render birth that way impracticable even when an incision is made in the said parts." Other indications given by him in this class were extra-uterine pregnancy, herniae of the uterus and rupture

of the uterus. "In all these cases, instruments are of no value and the only means we have of saving the mother is by the Caesarean operation." In the second class, when the foetus was alive, he recommended the operation where delivery by the natural passages was impossible by reason of one of the causes already mentioned.

Burton considered that the dangers associated with the operation, haemorrhage and the making of incision into abdominal and uterine walls, <sup>were</sup> exaggerated by previous writers. Regarding haemorrhage he said "It is evident this haemorrhage has nothing so terrifying in it as they who have performed this operation tell us it is not very considerable." Concerning incision, he remarked, "Daily experience convinces us that incisions are made as safely in these muscles and the peritoneum as in other parts of the body; witness the operation for hernia, abscesses in different regions of the abdomen, wounds penetrating into the belly, cutting for stone the highway where the same integuments and bladder are cut and yet, when managed by skilful hand, the parts unite and do perfectly well. The womb itself has not been exempt from incision of various kinds as we find in several authors." He mentions here the case operated on by Mary Donally.

He considered that to abandon a poor woman to certain death, where she might be saved by the Caesarean operation, was a "great piece of inhumanity"

and "is certainly unpardonable according to the old maxim "Quem non pervasti, dum postvesti, illium occedesti" - "To neglect to save a person when it is in your power to do so is accessory to his death - and to decline the operation in this case is to be accessory to the death of two persons." "Since therefore both reason and repeated experience confirm the possibility of success of this operation, nothing should deter a skilful surgeon from performing it when it is absolutely necessary; and that does happen, is unanimously agreed as we see above."

A careful account of the operation is given although he himself never performed it. "Everything being ready such as instruments, lint, compresses, etc., and the patient being held by four persons strong enough, the operator must make a longitudinal incision on the outside of the rectus muscle, between the navel and the angle of the os ilium; the skin and the membrana adiposa are to be divided for the space of about eight or ten fingers breadths passing afterwards through the oblique and transverse muscles and then carefully through the peritoneum in which a small puncture must be made and further divided by an incision knife that has an obtuse point, or a pair of scissors, till the opening appears large enough to extract the foetus; this done, the operator must reach where the child is lodged; and if it be lodged without side of the uterus in the cavity of the abdomen, it should be immediately extracted together

with the afterbirth; but if it be contained in the Fallopian tube, or in the ovary, these parts are to be opened and the foetus with its placenta removed; but if it be within the uterus, that must be opened by making a longitudinal incision sufficient to give a passage to the child and its appendages; and after they are removed, the extravasated blood is to be taken away by sponges made warm in water and the uterus will soon contract itself and the wounded parts will unite again. The wound in the abdomen is to be joined together by two or three sutures as is usual in the like cases in such wounds." Except for a few minor modifications there was little change in the method of operating during the next 100 years.

Burton was the first British obstetrician to write in favour of Caesarean section; one reason why his views have been given in some detail. The various indications which he gave for the operation remained unchanged for many years, at least in the eyes of those who might be called pro-Caesareanists, admittedly rather a rarity in Great Britain during the eighteenth century. The fact that the operation had, up to the time when Burton published his book, only been performed in Great Britain on three occasions, suggests that he derived most of his conclusions from writings of French obstetricians. His book did not receive a very favourable review and suffered in comparison with that classic of medical



literature, "A Treatise on the Theory and Practice of Midwifery" which was published in the following year, 1752, by William Smellie.

William Smellie, the Master of British Midwifery, was born in ~~Lanark~~ <sup>Lanark</sup> in 1697 and graduated at the University of Glasgow. After a period of general practice in Lanark, by which he was not particularly attracted he, like many of his countrymen, viewed what Johnson called the finest prospect in Scotland - the road to England - and by it came to London in 1738. The following year he studied in Paris under Gregoire, and on his return commenced practice in London. He retired in 1759 and died in 1763. Nine editions of his Treatise appeared in English and translations were made into French, German and Dutch. His other writings included "A Course of lectures upon Midwifery" (1742, 1748 and 1753), a "Collection of Cases" (1754), a "Collection of Preternatural Cases" published in 1774 after his death and the famous "set of Anatomical Tables" (1754).

Regarding Caesarean section, he took what, for his time, may be called a sound, common sense view of the matter. "When a woman cannot be delivered by any of the methods hitherto prescribed and recommended in laborious and preternatural labours, on account of the narrowness or distortion of the pelvis into which it is sometimes impossible to introduce the hand; or from large excrescences and glandular swellings that fill up the vagina and cannot be removed; or from large



cicatrices and adhesions in that part and at the os uteri which cannot be separated; in such emergencies, if the woman is strong and of good habit of body, the Caesarean operation is certainly advisable and ought to be performed; because the mother and child have no other chance to be saved and it is better to have recourse to an operation which has sometimes succeeded than leave them both to inevitable death." "Nevertheless, if the woman is weak, exhausted with fruitless labour, violent floodings or any other evacuations, which renders her recovery doubtful, even if she were delivered in the natural way; in these circumstances, it would be rashness and presumption to attempt an operation of this kind which ought to be delayed until the woman expires and then immediately performed with a view to saving the child."

His description of the operation is similar to that of Burton but he stresses the necessity of strengthening the patient with "nourishing broths and cordials" prior to operation and of ascertaining that the bladder and rectum are both empty. He advised that in suturing the abdomen, sufficient room should be left between the last stitch and the lower end of the wound "for the discharge of the moisture and the extravasated fluid." In the after treatment, he recommended rest and quietness and "everything administered to promote the lochia, perspiration and sleep; which will prevent a fever

and other dangerous symptoms." Broths, cordials, and wines ought to be given if haemorrhage has been severe. Smellie's experience of the operation was limited to three cases in 1747 and 1748 in which he performed the operation after the death of the patient from haemorrhage due to placenta praevia. In all cases, the children were dead. He mentioned, like his contemporaries, the case of Mary Donally.

Undeterred by the recent appearance of books on the same subject, Benjamin Pugh, a surgeon practising at Chelmsford in Essex, published a "Treatise on Midwifery" in 1754. He considered Caesarean section a most dangerous operation. Commenting on the reports of French writers who related that the operation had been performed on women who had had children both before and after undergoing it, he remarked that "this is very extraordinary indeed and seems, I think, to be sporting with lives" - he went on - "it certainly cannot be warrantable neither ought to be done as there must be great danger in it but where there is an absolute impossibility of delivery in any other way, and this is the only chance the mother and child have of being saved."

The year 1769 was a notable one in the history of Caesarean section. An outstanding event was that, for the first time, and the last for many years to come, the wound of the uterus was stitched albeit in a very cursory manner. This was the work of a French surgeon, named Lebas. He gained neither fame nor glory from

his efforts, in fact the very reverse, for although his patient recovered he was severely criticised by his colleagues. The subject will be considered again when the history of the early efforts to suture the uterus are discussed.

In spite of the fact that successful cases were reported from time to time, there is no doubt that a very great mortality resulted from the operation during the period under review. Many more successes than failures are chronicled but this was without doubt due to the fact that whereas, successes were proclaimed far and wide, nothing was heard of the many fatalities which must inevitably have followed the operation. The operation was performed much more frequently on the Continent of Europe than in Great Britain, and apparently, with much better results, the reason for which will be considered presently. When the state of surgery in general is considered, together with the fact that many of the patients had been long in labour before the operation was carried out and that most of the subjects were in very poor general condition, even before labour had commenced, suffering from rickets and other debilitating diseases, the results are not surprising. The efforts of obstetricians had been devoted to the improvement of various instruments, such as the crochet, designed to effect delivery by the natural passages, but in 1777, a new

operation was tried out.

It was to a French surgeon, M. Sigault, that the world was indebted for the introduction of the operation entitled symphyseotomy. Its performance was based upon assumed fact that the two halves of the joint forming the symphysis pubis separated spontaneously during labour. In 1768 Sigault presented a memoir to the Faculty of Medicine in Paris proposing that the operation should be tried on animals at first and later on condemned criminals. The report did not meet with a favourable reception and the matter remained in abeyance for some time. Sigault, however, was not discouraged and again proposed the subject in his Thesis on taking a degree at Angers. This time it received a more favourable reception. The operation consisted in making an incision through the integuments and soft parts in the direction of the commissure of the ossa pubis. The articulation at the cartilaginous symphysis was then divided by the knife. In an endeavour to avoid injury to the bladder, a catheter was introduced. The knees of the patient which had been kept gently separated by an assistant, were then firmly forced apart in order to distract the bones. The contractile efforts of the uterus were then awaited. If unsuccessful, embryotomy or craniotomy was the next step.

The operation was first tried out on October 1st, 1777, on a patient on whose baby craniotomy

had been performed at the previous labour. Success attended it, and although the patient's bladder was injured during its performance and she very nearly died, there was great enthusiasm. On the strength of this one case, medals were presented to M.Sigault and to his assistant, M.Alphonse le Roi, and a pension awarded the former. They were also introduced to the reigning monarch Louis XIV. It is but fair to add that a pension was also awarded to the patient who was the subject of this daring experiment.

Sigault operated upon four further women, one of whom died. The results of the operations, which at first appeared to promise so much and possibly do away with the necessity of Caesarean section, were disappointing. Sigault himself became less confident of success as time went on and refused to perform it unless there was a space of  $2\frac{1}{2}$  inches in the short diameter of the pelvic brim, and before his death, in such cases, he recommended Caesarean section. After the initial excitement and the enthusiasm, the operation was performed less and less frequently. Thus, in his tables, Churchill mentions 40 operations performed between 1777 and 1785 and only 9 from this latter date up to 1836.

This operation was never favourably received in Great Britain with one or two exceptions. John Leake (1729 - 92), the Founder of the New Westminster lying in Hospital in 1765, as a result of an experiment made

on the body of a woman who had died in labour, was inclined to favour the operation "which has already succeeded and therefore it will again succeed." It is but right to add that when he wrote these words, the enthusiasm for the operation was at its height. Benjamin Bell also favoured symphyseotomy in preference to Caesarean section. William Hunter (1778) was the first in this country to investigate the efficacy of the operation but his observations were not favourable to it. Osborne remarked that "no circumstances whatever, real or imaginary, can ever render it a warrantable operation." German writers were largely of the same opinion. The operation was performed in 1782 for the first time in Great Britain by Mr. Welchman of Kingston, Warwickshire. The child was macerated and the mother died.

John Aitken of Edinburgh went even further than Sigault in suggesting an alternative to Caesarean section. In his book "The Principles of Midwifery or Puerperal Medicine" he suggested what he called "Pelvitomia nova." The idea was to make a segment of pelvic girdle moveable. To this end, he suggested making two incisions one on each side reaching to the ossa pubis as near the crural vessels as safely may be, so that one may be distant from the other about four inches, and two corresponding to and touching the joinings of the rami pubi and ischiorum. The bones were then divided by the flexible saw



without wounding the peritoneum, bladder, urethra or vagina. Then the segment of the pelvis became moveable and yielded to the pressure of the child so as to allow delivery." He asked, "If due attention be paid to the wound, may not the healing take place in such sort that in future sufficient capacity of the pelvis may be preserved?"

Aitken never put his suggestion into practise himself. Such an operation was tried out in Italy in 1832. The patient was a primipara of 23 with marked distortion of the pelvis due to rickets and whose membranes had ruptured between two and three days before admission to hospital at Naples. The operator was M. Ippolyto, although Galbiati had suggested the procedure, and was present when it was carried out. In addition to the measures recommended by Aitken the inter-pubic cartilage was cut in the median line. After the operation the woman was put in a warm bath. The pains becoming strong, but no progress being made, large doses of ergot were administered. After 20 hours of violent uterine contractions a dead child was delivered. The woman died on the eighth day from peritonitis.

The Editor of the Journal (*Il Febatre Petarzio*), in which the case was reported, considered that the operation was performed too soon and that both mother and child might have been saved, if it had been delayed until the os uteri was well dilated. The case was subsequently reported in a British Journal



and the commentator (1843) called the operation "murderous", saying, "we have read of many barbarous proposals and still more barbarous doings by surgeons of the present day; but certainly this novel obstetric operation which, we observe, is called pubiotomy, surpasses all in outrages on science as well as humanity. Heaven defend us from such a proposal being ever so much as entertained for a moment in this country! The man who presumed to do so would be surely scouted either as a monster of barbarity or as a madman." Apparently the commentator had not heard of Aitken's suggestion.

Having considered the alternative to the much dreaded Caesarean section, there are a few more British writers of the 18th Century whose opinions and remarks merit consideration. As a representative of the Irish School of Midwifery, the "Observations" of William Dease, published in 1783 may be cited as an example. He condemned the operation and justly, like some of his predecessors, remarked that in some of Rousset's cases, the operation had been performed unnecessarily. He said, "There appears to be very little ground for the circumstances recorded by the generality of authors in favour of this operation, to encourage the rational practitioner to attempt it. The operation seems in general only to have been performed by ignorant and rash men, who had no reputation to lose, and were anxious to establish one, although their fellow creatures' lives should be the

purchase." He stressed the danger from haemorrhage, inflammation of the uterus which must follow it, and peritonitis, etc. "All this on a poor, weak, distorted woman, exhausted in all probability by a previous long labour." He approved of its performance post-mortem but considered the danger of symphysectomy worse to the woman and without the same advantages to the child. He declared that the operation had never been performed in Dublin, indeed in 20 years of practice he had never heard of a case where it was necessary. "Much to the honour of Irish surgeons they have uniformly discountenanced all these rash and enterprising operations."

Whatever progress had been made in establishing Caesarean section in Great Britain during the eighteenth century - it must be admitted, as will shortly be shown, that it was but little - it was not advanced by the writings of William Osborn. Born in 1736, he studied first at Uppingham and later in London under William Hunter and in Paris under Levret. After a spell as a military surgeon, he founded in 1770, along with Thomas Denman, a successful school of midwifery. He was Physician to the London General Lying-in Hospital for many years, retiring in 1800 and dying at Dover in 1808. He wrote two books, the first, "An Essay on Laborious Parturition in which Division of the Symphysis Pubes is considered.", London, 1783, and "Essays on the Practise of Midwifery in Natural and Difficult Labours" 1792, (second edition 1795).

Osborn had a great horror of the operation and this opinion is noticeable in all his works. For advocating this in cases of extreme pelvic contraction, he attached <sup>R</sup> Professor A. Hamilton with some asperity. In his work of 1792, he considered, in the fifth of these essays, that degree of difficulty, which depending on the distorted form and diminished capacity of the pelvis, was compatible with the safety of both mother and child. In this case, he says, the life of the child must of necessity be sacrificed to the preservation of the mother, or the mother herself for the certain safety of the child, must "be doomed to inevitable destruction by the Caesarean operation." He endeavoured to show and confirm by several cases that a child, at full maturity, of the ordinary size, ~~might~~ with its head opened, be extracted by a crochet, with perfect safety to the mother through a much smaller and more distorted pelvis, than had hitherto been supposed capable of admitting such a delivery.

His compassion for such poor women is well shown in the following passage:- "it is impossible to enter upon the consideration of the subject of this essay without feeling and lamenting the calamitous condition of the sex, who at all times of parturition are exposed to the severest bodily pain, but, who, in this case of extreme deformity are incurably reduced to the cruellest deformity that imagination can conceive; an alternative the more deplorable, as woman is the only created being who

is subject to it; the misery of which is not produced by human vice nor can it be prevented by human prudence. While the humblest of the sex, therefore, have the strongest and most complicated claim upon our benevolence and skill, the general welfare of society calls for our best exertions to lessen this undeserved affliction by banishing from practice that unwarrantable, because most fatal, operation, the Caesarean section and by preventing the introduction of its substitute, the division of the symphysis pubis as equally unnecessary - though certainly less dangerous."

When the antero-posterior diameter of the brim was  $2\frac{3}{4}$ " or less he stated that one of four things must happen - the infant's head must be opened, Caesarean section or symphyseotomy must be performed or the woman dies undelivered, as had recently happened to a Grand Duchess of Russia. He said, "the fatal Caesarean operation has in general heretofore been most unnecessarily performed" and added that he would "endeavour to rescue my countrywomen from a new, precarious and, I think, preposterous operation, which, originating in France, has unhappily extended over the whole continent of Europe."

He entered, in support of his views, into a lengthy discussion on the respective value of the life of the mother and that of the child in utero. He considered that the latter was "incapable of

mental apprehension" and "not in possession of bodily sensation."

Holding such views on Caesarean section and symphyseotomy, Osborn had only craniotomy left as a means of dealing with pelvic contraction. He recommended the performance of the operation early in labour and said that delivery with the crochet and forceps was always possible if the antero-posterior diameter of the brim equalled  $1\frac{1}{2}$  inches or where there was a space equal to that width on either side of the projecting sacrum.

In difficult cases, he advised leaving the body to putrify in the uterus in order that it might soften and be more easily extracted. While it is a digression from the subject, the celebrated case of Elizabeth Sherwood is an illustration of the lengths to which Osborn went rather than perform Caesarean section. The pelvic measurements are best described in Osborn's own words - "The pelvis measures in the short diameter, from sacrum to pubis -  $\frac{3}{4}$  of an inch. On the left side, quite to the ilium, which was about  $2\frac{1}{2}$  inches in length, the space was certainly not wider, it was thought to be even narrower. On the right side, the aperture was rather more than two inches in length, from the protuberance to the ilium; it was at the utmost about  $1\frac{3}{4}$  inches from the hind to the forepart but it became gradually narrower both towards the ilium and towards the projection." Yet 36 hours after the child's head had been opened,

the child was delivered, and on the seventh day, "the patient was as well as at any former period of her life."

The case naturally excited great interest but some of Osborn's colleagues such as Hamilton, Johnson and Burns were frankly sceptical.

It is regrettable that such a learned and experienced obstetrician should have been so bigotted against Caesarean section. Instead of ruthlessly brushing aside the records of successful Caesarean sections as incredible, he might have taken up a more favourable and more reasonable attitude to an operation which, even in those days, occasionally saved both mother and child. At the same time, it must be remembered that Caesarean section and symphyseotomy were almost always fatal in this country and that fatal results to the mother from craniotomy depended almost entirely on its being performed too late.

Alexander Hamilton of Edinburgh, who was Professor of Midwifery at that University from 1780 to 1800, and who was succeeded by his son, James, later Sir James Hamilton, admitted the necessity for Caesarean Section only in cases of contracted pelvis. Considering the early case records, he said, "the accounts which history transmits both of the cases and causes for the operation are so vague and absurd, they carry along with them so little appearance of probability that nothing can be concluded from them; and in fact,

such fabulous histories should be received with incredulity rather than confidence."

In his opinion, Caesarean section was necessary when the shortest diameter was only  $1\frac{1}{2}$  or  $1\frac{3}{4}$  inches. He did not agree with Osborn's assertion that  $1\frac{1}{2}$  inches was sufficient for extraction with the forceps and crochet. With the indications given by other writers, such as constrictions from cicatrices, callosities, etc., lacerations of the uterus, extra-uterine pregnancy and hernia of the uterus, he did not agree. "Upon the whole, when by a careful mensuration with the fingers, the pelvis appears to be faulty to such a degree as to refuse passage to the diminished size of the child's head by embryulcia, for we unreservedly condemn the division of the symphysis pubis, in other words, when it appears absolutely impossible to deliver the woman by any other means, which is to be determined by a consultation of experienced practitioners, we ought then only to employ the dreadful expedient of cutting into the uterus to extract the child." Hamilton wrote a number of works on obstetrics the chief of which was his, "Outlines of the Theory and Practice of Midwifer" which was first published in 1783 and passed through many editions and from which the above remarks are quoted.

The views of Thomas Denman (1733 -1815) who, after an early struggle, became the leading obstetrician in London after the death of William Hunter in 1783, were the same as those of Hamilton in that the only



condition in which he admitted the necessity of the operation was marked distortion of the pelvis. Like Hamilton, he stresses that the impossibility of delivery by any other means "shall be confirmed not by the opinion of one, but as many competent judges as can be procured."

He made many contributions to obstetric literature but the two most notable were his, "Aphorisms in the application and use of the forceps and vectis in preternatural labour, in labour attended by haemorrhage, and with convulsions" first published in 1783 which passed through nine editions and was published in America and translated into French, and his "Introduction to the Practise of Midwifery", in two volumes, 1794 and 1795, of which seven editions appeared, the last in 1832.

In this latter work, he points out that it is difficult to lay down any hard and fast rules with regard to the diminution of the cavity of pelvis below which Caesarean section is necessary. He admitted, however, that, "if the cavity be so far closed that it should not exceed one inch, of which examples have sometimes occurred, we might then presume that the head of the child, though reduced to the least possible size could not be extracted through it, and the necessity and propriety of the Caesarean operation might be admitted, if we had reason to conclude that the child was living." He pointed out that each case

must be judged on its merits, stating that the kinds of distortion are as varied as the degrees and that the cavity, though much diminished in one part, may be less altered in another.

He also raised one very important point which did not appear to have been considered by his predecessors. "I cannot, however, relinquish the subject without mentioning another statement of the question which has often employed my mind, especially when the subject has been actually passing before me. Suppose, for instance, a woman married who was so unfortunately formed that she could not have a living child. The first time of her being in labour, no reasonable person could hesitate to afford relief at the expense of her child; even a second or third trial might be justifiable to ascertain the fact of impossibility. But it might be doubted in morals whether children should be gotten under such circumstances; or whether, after a determination that she cannot bear a living child, a woman be entitled to have a number of children (more than ten have sometimes been sacrificed with this view) destroyed for the purpose of saving her life, or whether, after many trials, she ought not to submit to the Caesarean operation as the means of preserving the child at the risk of her own life. This thing ought to be considered." He agreed that the husband and wife should separate "when it has been ascertained

that women could not possibly bear living children and one great end of marriage had been frustrated." "Many evils", he thought, "might thereby be prevented."

If the operation by Mary Donally, recovery from which must be considered a matter of good luck rather than good judgement, be excluded, the first successful case of the Caesarean section in this country occurred in 1793. Eleven previous attempts had all resulted in the death of the mother although six children were saved. Two of these have already been mentioned, those by R. Smith of Edinburgh and by Dr. White of Manchester. In Scotland Prof. Thomas Young, (1771), who was Alexander Hamilton's predecessor at Edinburgh, operated twice before 1771. He was followed by Mr. A. Wood, and Mr. W. Chalmers, both of Edinburgh, (Hamilton 1791), the latter in 1774 and Mr. M. White of Glasgow in 1775 (Hull 1788). In both Prof. Young's cases the infants were saved, as it was in that of Mr. W. Chalmers. In England, Mr. Thompson (1771) of London, saved a child after an operation in 1769, a similar result following in 1771 an operation by Messrs. Hunter and Cooper (1771), also of London. In 1777 Mr. Atkinson of Leicester also saved a child (Hull 1798). Mr. Clark (1792) of Wellingborough was the operator in the last of this series. Only one of all these patients had been in labour less than two days; that of Chalmers had been in labour

twelve days, and that of Clark eight days before operation.

To a surgeon of Blackburn, Lancashire, fell the signal honour of performing the first operation from which the mother recovered. James Barlow was his name and strange as it may seem, the account of it was not published until 1798. The following is the description in the author's own words:-

"Jane Foster, the subject of the following case, resides in the village of Blackburn, about five miles from Chorley, is about 40 years of age, of a robust constitution and has had several children. She had the misfortune on returning from Wigan market to fall from a loaded cart, the wheel of which passed over her pelvis as she lay on her back. The injury she suffered from this accident made confinement necessary for about six weeks. She was attended on this occasion by Mr. White of Manchester, Mr. Hawarden of Wigan and some others. From enquiry from Mr. Hawarden, I learned that one of the ossa ilei was fractured and much injury done to the whole pelvis, particularly to the ossa pubis. The woman being then in very great misery, was very adverse to an accurate examination; yet the above statement seems highly probable both from an irregularity of feel at this part and from the elevation of the head of the thigh bone on the left side; this produced a shortening of the limb and, of course, a limping.

Soon after her recovery from this injury,

she became pregnant and on Friday, November 22nd, 1793, she was seized with labour pains, being then at the full period of uterogestation. The midwife who attended her in her former labours was sent for on this occasion; but having waited with her for several days without the least prospect of delivery, she thought it advisable to have more assistance especially as the water was discharged on the second day of labour and no part of the child could be ascertained to present within reach.

On Tuesday, the 26th, I was desired to meet Mr. Hawarden of Wigan upon a consultation on this case; but arriving a little before him, I examined the parts per vaginam and was extremely surprised to find that I could barely pass my fingers between the ossa pubis and the last lumbar vertebra, so great was the narrowness of the brim. Besides this, the outlet was so much contracted that it was with some difficulty that I could introduce three fingers at that part. After asking some questions I was informed of the accident. This information induced me to repeat my examination with more exactness, in order the better to ascertain the precise dimensions. Having introduced my finger again, I perceived a very evident depression of the ossa pubis with a protuberance in a direction somewhat more towards the hollow of the sacrum, than in an exact line with the with the last lumbar vertebrae. From this I am led to suspect that there had been, besides the fracture,

a separation of the symphysis pubes and that the protuberance just mentioned was the consequence of a deposit of bone at the separated part; and some idea may be formed of its quantity from knowing that it projected to within half an inch of the os sacrum. With some difficulty I carried my finger up sufficiently high to judge concerning the degree of dilation of the os uteri which appeared to be considerable, as far as I could judge, from feeling its anterior edge which was thin and flabby; but no part of the child was within reach. The pains had left her the night before, her anxiety was very great, her pulse full, and respiration difficult. This last symptom was moderated by the loss of ten ounces of blood from the arm.

On conversing with Mr. Hawarden, he conversed with me concerning the nature of the case and the impossibility of bringing the child away through the natural passage. Some little conversation passed on the propriety of a division of the symphysis pubis; but it appeared to us both that the narrowness at the pubis was too considerable to allow much advantage from such an operation; therefore, that project was soon abandoned. The only alternative then was Caesarean section, but the well known danger of this induced Mr. Hawarden to decline taking any part in it and he returned home.

Convinced, therefore, of the impossibility of

effecting delivery by any other means, it was proposed to the attendants, but was not then assented to. Indeed, the idea seemed so dreadful that I did not urge it much, especially when I recollected that of nine or ten instances in which that operation had been performed, in this country, not one had furnished a voucher of its success. In this forlorn and dangerous situation, she was left to the care of the midwife and desired to make up her mind as soon as possible concerning the operation. On the morning following I was again sent for and found her lingering in the same position. She consented to the operation without the least hesitation. I immediately called in as an assistant, Mr. Hawarden, a practitioner in the village (Blackrod) and brother of Mr. Hawarden of Wigan before mentioned. The patient being taken out of bed and placed upon a table lying on her back with her head raised by pillows, I began by making a longitudinal incision,  $5\frac{1}{2}$  inches in length, as high as the navel, parallel to the linea alba and about two inches to the left of that line. The integuments and the left rectus muscle being cut through, a small opening was made through the peritoneum at the upper part and, by means of a probe pointed bistoury, this membrane was dilated to the same extent as the external parts. The uterus was now exposed to view and an incision of the same length was continued through it. The child presented with its breech and



was extracted through the artificial opening, but unfortunately was dead, yet did not show any material signs of putrefication. The placenta and membranes were then extracted with the greatest ease. The uterus was very thin, scarcely exceeding that of the peritoneum and equally so through the whole extent of the incision. No attempt was made to examine the pelvis through the abdominal wound. The hands of the assistant were applied to each side of the abdomen to prevent the admission of external air and to press out any blood that might be diffused among the intestines; after which the sides of the wound were brought together and secured by seven stitches over which strips of adhesive plaster were applied and the dressing completed by a few turns of a flannel roller round her body.

The peritoneum was not included in the sutures and no part of the viscera protruded during the operation; neither were there any blood vessels divided which required to be secured by ligature. It was fortunate that no haemorrhage followed the extraction of the placenta as was to be apprehended from the condition of the uterus, the effect of long distension. The womb contracted properly, the lochia were about the usual quantity and continued as in other cases. The poor woman scarcely complained during the operation, so great was her fortitude. Soon after, she was put into bed,

slept without taking any medicine for that purpose, and passed a good night. On the 29th, she complained of a fullness about the region of the stomach with an inclination to vomit, and on laying my hand on the abdomen a degree of distension was distinguishable. Her tongue had a whitish appearance and her pulse was about 120. A laxative clyster was administered with the desired effect and the tension of the abdomen with pain yielded to the stimulating effect of a blistering plaster. In short, all the symptoms which had before indicated irritation now suffered a very obvious remission. Four days having elapsed since the operation it thought eligible to remove every other suture; on the sixth the remaining ones were taken away and the wound appeared healed.

Though she had been a nurse to her other children, she experienced no uneasiness in her breasts on the present occasion. Her health continued in an improving condition until December 4th when it received some interruption for a few days from diarrhoea but which was checked by an astringent mixture. On the 10th. she ventured out of bed, on the 17th. she began to attend to her domestic employment from which time to the present (September 23rd. 1796) an interval of nearly three years she has continued in health, menstruated with regularity, but has never been pregnant."

Such is the story of the first operation of Caesarean section in England from which the mother

recovered although whether it was a "true" Caesarean section according to the definition given at the beginning of this essay is, as has already been stated, open to some doubt. Most historians on the subject, however, admit it to be so. A good idea of the opinion of the medical profession on the operation at that time can be judged from the fact that the practitioner who was at first in charge of the case declined "taking any part in it and returned home."

It was not until April 1834 - nearly forty years later - that another successful operation was performed in England (Greaves 1834). During the remainder of the 18th century, six other Caesarean sections were performed in Britain but in every case the mother perished. Three of them took place in Scotland. The first of these was in 1795, the surgeon being Dr. James Hamilton (1796), the second in 1798, by a Mr. Kay of Forfar, quoted by Hull (1799), and the third in 1800, the surgeon being Mr. John Bell (1819). In this last, the child was preserved. The three English cases all occurred in Lancashire, one in 1794, one in 1798, and one in 1799. John Hull (1799) of Manchester was the surgeon in the first two and Mr. Wood (1799), also of Manchester operated on the third case; each had the satisfaction of saving the child. To Hull, of whom more will presently be related, falls the

honour of being the first in this country to perform more than one Caesarean section.

There has been no subject connected with medicine, except perhaps "Listerism" which created more bitterness of feeling and animosity in the minds of those who may be called Caesareanists and anti-Caesareanists, and in no city or town in Britain did these repugnant and unprofessional feelings exist to a greater extent than in Manchester. The important but rancourous controversy which took place at the end of the 18th century between Dr. John Hull and Mr. W. Simmons of that city is worthy of record.

In 1798, Simmons published a work entitled "Reflections on the Propriety of Performing the Caesarean operation." It was dedicated to Dr. John Ferriar, M.D., in a brief note dated December 12th, 1798. He commenced his "Reflections" by remarking on the reported success of the operation on the continent and its universal fatality in England. Apparently he chose to ignore Barlow's case. He suggested that the difference in climate might be responsible and remarked that "impressed with these sentiments I have been induced, by a late occurrence (the specific case is not mentioned) to re-examine the subject and to lay the result of my inquiry before the public, to prevent as far as my influence shall extend, the revival of an operation that has proved so fatal to my countrywomen." He cast

doubts on the accuracy of Rousset's reports and quoted the opinions of Pare, Guillemeau, Dionis and Mauriceau, the latter at length. He approved of the performance of the operation after the death of the mother but expressed the view that when the child was dead and the mother alive, the crochet should be used. He protested most strongly against the operation when both mother and child were alive, presuming on the "universal fatality" of the operation and quoted William Hunter's views with regard to the relative value of the life of the mother and that of the child. He disagreed with Denman's view that there may be "occasionally" cases requiring the operation. "Would it not be better that a woman should die undelivered, rather than, contrary to all precedent among us, and the rules of art, she should be consigned to such an end? Life is in the hands of God!, and as there are cases of recovery by the powers of nature, working an outlet by abscesses and in other ways, the only hope for the patient's surviving is by a reliance on her art." He disbelieved Hoffman of Prussia who had informed Hamilton that the operation had often been successful in Germany, adding, "the state of surgery in Germany is too well known to induce a belief of so unusual an occurrence."!

After remarking upon the cases mentioned by Baudelocque and also one (fatal) by Campier of Holland, he went on, "Every rational practitioner

will feel himself governed by the result of the best experience of his own country, which will vary with that of other countries, from differences in climate, custom and other causes; guided, however, by the probable truth of foreign as well as domestic recital; and I hope no Englishman will attempt to regulate his practice in this operation from foreign accounts of success, for I should pity his patients without envying his credulity."

After adversely criticising every step of the operation and stating that "it does not call for manual dexterity" he quoted and supported Osborn's opinions at length and gave a full account of the case of Elizabeth Sherwood, and two similar, by Clarke. He further suggested a combination of the crochet operation with division of the symphysis pubis for such cases as cannot be dealt with by the crochet alone and concluded his pamphlet by saying, "I hope that in future all trace of Caesarean operation will be banished from professional books; for it can never be justifiable during the parent's life and stands recorded only to disgrace the art."

This publication was attacked by Hull in a letter to Simmons entitled, "A defence of the Caesarean operation with observations on embryulcia and the section of the symphysis pubes", and dated December 24th, 1798. He called Simmon's book "a compound of unjust and malicious insinuations against a man who never gave you the least offence;

of pernicious precepts, of false assertions and of garbled extracts."

He accused Simmons of inconsistencies, errors in translation done deliberately to suit his purpose and of omitting certain passages, in his quotations from other writers, for similar reasons. He strongly disputed Simmon's assertion that the operation was always fatal to the mother and refused to admit that it would be better to allow both mother and child to perish than to preserve the latter by Caesarean section. Hull asked how it was that where reliance on nature was recommended, the same writer advised a combination of two operations (use of crochet and symphyseotomy). Simmons strongly supported Osborn's views and boldly affirmed that he "has proved that the child may be extracted by the crochet whatever the distortion shall be, if in any part of the cavity there shall be a space of  $1\frac{1}{2}$  inches in diameter." As Hull pointed out, this was a "gross misrepresentation". Osborn specifying that the space referred to was from fore to hind part of the pelvis and asserted that there never could have been a pelvis so contracted that there was not in some part of the cavity, a space of more than  $1\frac{1}{2}$  inches. Hull disputed this point of view of Osborn and regarded it as "calculated to do great mischief, inasmuch as his authority may induce the less experienced accoucheurs to destroy the life of the child which might have been preserved by



Caesarean operation, incases where they will afterwards be unable to complete the delivery of the child." Osborn believed that a child in utero was incapable of feeling any pain or distress when the crochet operation was performed. This was strongly denied by Hull who produced much evidence to support his views. He also stressed the necessity of ascertaining as far as possible all the dimensions of the pelvis, not being content with those of the superior aperture.

Simmons replied to Hull in a publication entitled, "A detection of the fallacy of Dr.Hull's defence of the Caesarean operation." Most of it consisted of a repetition of his previous pamphlet, but he added to it a violent attack on Hull. Much of the matter was irrelevant and one reviewer described it in the following terms:- "Rancourous and personal invective have on both sides taken the place of argument and the point in dispute is lost in the scurrilous and intemperate language of the writers. The matter, which it is our part to notice, is small indeed. The question, in fact, remains just where it began."

Hull countered with his "Observations on Mr. Simmons detection etc., etc., with a defence of the Caesarean operation", in a second "letter to Mr. William Simmons" dated May 22nd, 1799, a lengthy document of over 470 pages. He described some of Simmon's writings under such terms as

"ribaldry, libel, hypocrisy, nonsense," and so on. The first part of the "letter", about 90 pages, consisted mainly of a violent personal attack upon Simmons and of further arguments about the accuracy of his translations. After repeating his views on Osborn's opinions, he went on to give an excellent dissertation upon the various circumstances which may necessitate the performance of Caesarean section. With regard to distortion of the pelvis, he laid down the following rules:-

- (1) When the antero-posterior diameter of the brim of a ricketty pelvis is less than 3 inches but more than  $2\frac{1}{2}$ , a small foetus may be born alive through it, or even a moderately sized one if the head is very compressible or the uterine contractions very strong.
- (2) If the same diameter is less than  $2\frac{1}{2}$  inches but more than  $1\frac{11}{12}$ , the foetus, unless premature, cannot be extracted alive but may be with a perforator and crochet.
- (3) When the same diameter, as a result of malacosteon, is  $1\frac{3}{4}$  inches, embryulcia is possible; where the diameter is less than these Caesarean section is necessary. He rightly pointed out "that an obstetrical operation which is possible is not always practicable and that one which is practicable, cannot always be performed

with safety to the mother."

He also favoured Caesarean section in certain wounds of, and some cases of rupture of, the uterus, and in extrauterine gestation if the child was alive. In hernia or obliquity of the uterus, he considered it not necessary and but seldom in affections of the os uteri, vagina or os externum. He thought it might be required also in occasional cases of convulsions, abnormal presentations and monsters. Hull described a number of elaborate experiments made with wooden models of pelves in support of his views. He gave tables of 110 successful cases, all but two from the continent of Europe, and 27 fatalities. His writings on Caesarean section were most valuable to the profession of the time and cleared up many misunderstandings. He showed that in the majority of the fatalities, no other result could be expected. Of his 15 cases occurring in Great Britain and Ireland, the lives of eight children and two women were saved who would in all probability have sunk under the unavailing pain of labour or the attempt to perform embryulcia since the attendant practitioners saw no possibility of saving them by that mode of practice.

An unsuccessful Caesarean section in Manchester one month after Hull's last publication gave Simmons (1799) another opportunity to voice his views.

A patient named Elizabeth Thompson commenced in labour on June 24th, 1799. A Mr. Ogden was

sent for and called in Simmons for further advice. No attempt was made to deliver the patient who was transferred to the Manchester Lying-in Hospital. She was suffering from marked distortion of the pelvis, the antero-posterior diameter of the brim being no more than one inch owing to malacosteon. She was seen at the hospital by Mr. William Wood who called in consultation Messrs. White, Hall, Tomlinson and Thorpe. Caesarean section was performed the same night but the patient died 76 hours later. Wood attributed death to gangrene of the cervix found post-mortem and expressed the view that the patient might have recovered had the operation been done earlier. The post-operative history, however, suggests that the cause of death might have been intestinal obstruction due to ileus paralyticus.

About eight weeks later, Simmons (1799), in a letter to the Medical and Physical Journal repeated his views, without actually referring to this case and quoted the sixth commandment - "Thou shalt do no murder." He concluded his letter, "The Caesarean operation is inadmissible during the parent's life; and hence is derived a rule, at once plain and precise, to direct our conduct in this trying occasion, for when other means fail to accomplish the delivery or are deemed inexpedient, we can only deplore the miserable sufferings of the patient and the insufficiency of art to relieve them, and the disposal of life must be left to Him who gave it."

Two months later he wrote again, this time vigorously attacking Wood and pouring scorn on his (Wood's) suggestion of the cause of death. It appeared that when the patient was sent to Hospital, Simmons asked to be informed of the condition and progress but apparently this was not done. Ogden (1799) also wrote in support of Simmons.

John Sims (1799), of London, joined in the fray but his views were much more moderate. He thought the patient's sufferings were probably less than if she had died undelivered and refuted Simmons remarks about "murder" saying "his reasoning on this point applies with equal force against destroying the child to save the mother."

Finally, the consultants in the case, Messrs. White, Hall, Tomlinson and Thorpe published a statement confirming Wood's account of the case and supporting his views in all respects. They declared that many lives had been lost because Caesarean section had not been performed and that there was too much delay in doing it; that the child's life should not be put in competition with the mother's and that before carrying out the operation a consultation of the most eminent practitioners available should be held.

Such is the tragic history of Caesarean section in Great Britain up to the end of the eighteenth century - nineteen operations from which but two mothers and seven children were saved.

Few obstetric surgeons had the courage to perform the operation and these were more often than not roundly abused by their professional brethren. But as Hull and other pro-Caesareanists pointed out, the results could scarcely have been different when the state of the patient at the time of the operation is considered. Where the duration of labour prior to operation is known, (in five of the cases this was not stated in the published account), it is found that but two had been in labour for a period less than thirty hours, whilst four had been in labour for a period exceeding five days. Ten of the patients suffered from mollities ossum, a common disease amongst the extreme poor of the time. When these facts are considered, plus the danger of haemorrhage, about which opinions appeared to vary, and from peritonitis and other infection due to lack of antisepsis and the escape of the lochia from the unstitched uterus into the abdominal cavity, it seems remarkable that even two women survived such a hazardous undertaking.

The story of the operation on the continent of Europe for the same period is, however, a very different one and may now command attention. The writings of the outstanding writers on the subject, during the second half of the eighteenth century, will also be of interest.

M. A. Levret (1703-1780) of Paris, published 1770 a work entitled "Observation sur les causes



et les accidens de plusieurs accouchemens abortifs avec des remarques" which passed through several editions. His chief contribution to obstetrics was the introduction of the pelvic curve of the forceps blades. Regarding Caesarean section, after referring to the writings of M. Simon (1750), he expressed the view that, while the operation was sometimes required many of the earlier operations had been performed unnecessarily by "rash and unskilled attendants." He admitted but two indications:-

- (1) extrauterine pregnancy, operation for which he did not consider a true Caesarean section, and
- (2) deformity of the pelvis.

In the latter indication, he remarked "To decide absolutely on the impossibility of delivering the child alive, the accoucheur must not be able to introduce his hand through the pelvis to penetrate into the uterus: or cannot withdraw it when he has taken hold of one of the child's feet." For such remarks he was strongly criticised by Baudelocque and Lauverjat whose writings will be examined presently.

The latter, in a book entitled "Nouvelle Method de Pratiquer l'operation Caesarienne" published in 1788, gave a very long list of conditions in which he considered Caesarean section was necessary. In addition to contracted pelvis, he described a host of conditions, narrowing of the



soft parts, tumours, aneurysms, growths etc., which in his opinion required the performance of the operation. He also recommended it in certain types of hernia, obliquity of the womb and devoted much space to its performance in certain types of convulsions. This last is especially interesting. He was the first to propose the operation in such a condition and recognised the danger to the mother while the infant was still in utero and her improved chances after the child had been born. It will be dealt with more fully in the chapter recounting the history of Caesarean section in eclampsia.

Lauverjat also made many new and clever suggestions in the method of performing the operation, notably the use of a transverse incision of the uterus, claiming a number of advantages for it which will be examined in the section dealing with the development of the operative technique.

The next writer worthy of attention is Jean Louis Baudelocque (1746 - 1810), whose definition of the operation has been given at the beginning of this history, and who contributed so largely to our knowledge of the contracted pelvis. He published in 1790 a "System of Midwifery" which was translated into English by John Heath, an English naval surgeon. He was another who wrote in favour of the operation, advising it in deformity of the pelvis and possibly, in large tumours obstructing delivery, and in extrauterine pregnancy. Having

regard, however, to the definition given by him, the operation in this latter case cannot be called a true Caesarean section. He described and discussed the different methods of performing the operation at length, and described numerous successful cases.

Baudelocque also published two "Memoirs on Caesarean section" in 1798 and 1799. These were translated into English by John Hull of Manchester and published in 1801. They were brilliant expositions on the subject and are worthy of careful examination.

The origin of the first memoir was a successful case reported by M. Bacqua to the Society of Medicine at Paris. Messrs. Plessman and Baudelocque were appointed to examine and made a report which was read and discussed on September 8th and 18th 1798.

In his opening remarks, we find the following passage:-

"The Caesarean operation is once more the subject of great controversy: it is the entrenchment behind which are concealed the enemies of these spirited and enlightened men who, having dared to undertake it, and who disregarding the poisoned darts incessantly thrown against them, will doubtless continue to perform it, if they meet with new cases wherein it is absolutely necessary. But, timid practitioners, not daring to resist these attacks, will commit great faults and deliver up to death the mothers and infants they could have preserved, as

might appear from recent examples if the able men who compose the Society of Medicine do not admit and establish the principle of the necessity of this operation. May the reflections that I am about to lay before the Society enlighten it upon the subject of its true glory and the interests of humanity in defence of which its talents are employed." Such remarks can leave no doubt of the belief of the writer in the justice of his cause.

He admitted that the operation was not always successful but asked "But in these very cases, what would have been her fate if the operation had not been performed? Would her death, which in that case was inevitable, have been any more easy or less cruel?"

While he admitted the necessity of the operation in certain cases of extrauterine gestation, rupture of the uterus, and hernia of the uterus, it is his remarks on the two other indications for operation which are of greatest interest.

He pointed out the occasional necessity of it in tumours, cicatrices etc., of the soft parts obstructing the birth canal. Most of these affections, he said, could be dealt with by other means - incision or dilatation, but he drew attention to the difficulty and danger of attempting to remove hard scirrhus tumours of the vagina. He described a case where it was found necessary to "open the head evacuate the brain and pull away the bones, an operation which required hard labour for five hours", in order to

effect delivery, the maternal birth canal being obstructed by a large tumour. Two years later, the tumour having grown larger, Caesarean section was performed. The child survived but the mother lived only 5 days.

Baudelocque's remarks on distortion of the pelvis show him to have been a far seeing and deep thinking obstetrician. He declared that it was necessary to know:-

- (a) what was the relation existing between the dimensions of the distorted pelvis and those of the foetal head.
- (b) how much the last may be diminished by the pains of labour, and how far the first may be augmented.

He discussed the question of moulding of the foetal head very fully but pointed out that there was a limit to this and stressed the danger of injury to the bones of the skull and attachment of the cerebral membranes.

"The birth of a child", he wrote, "at fulltime, of the usual size and alive is generally impossible when the diameter of the pelvis is only  $2\frac{1}{2}$  inches." He also pointed out, however, that if a woman was delivered of a live child in such circumstances, by reason of the small size of the foetus, it did not follow that she would again enjoy such advantages. The converse also held good.

He also stressed the difficulty of delivery in

cases of contraction of the pelvic outlet and considered the crochet a dangerous instrument in the more marked degrees of pelvic deformity. He strongly disapproved of symphyseotomy, induction of premature labour, and attempts to reduce the size of the child by dieting of the mother.

He considered that Pare and Guillimeau were at fault in not ascertaining the accuracy, or otherwise, of Rousset's reports, particularly the former, "who had the greatest influence over the opinion of his brethren, as well as on account of his situation as his uncommon genius and knowledge." Like some of his predecessors, he attacked Mauriceau for his assertion that no case existed on whether the foetus could not be extracted in the natural way.

No apology need be offered for quoting in full, the masterly summing up of the situation. "So far from prohibiting the Caesarean operation, other laws should oblige us to perform it, if we can demonstrate that this operation is the only one which can preserve the child without being essentially fatal to the mother." In condemning the use of the crochet, he went on "The death of the child is the only circumstance which can authorise the use of the crochet and other instruments of this kind. But how can any certainty of this kind be acquired whilst it remains in the womb and a finger can scarcely touch a single part of its surface since it is sometimes difficult to obtain this certainty in a new born child though

exposed to our view and capable of being examined everywhere by the touch? How often, after strong appearance of the death of the child, have we heard its moans when just torn from the womb of its mother by a barbarous practice, at most excusable only in the first ages of the art? How often have we seen the scattered and palpating limbs accuse this then destructive art, or the practises of it, of a wicked attempt, which is so much the more shocking as none of the laws that protect innocence can punish it."

He gave brief notes of 73 cases from which 31 mothers were saved, the indication for operation being in the majority, distortion of the pelvis. Four of the fatal cases were in a hopeless condition at the time of operation, and in six others the cause of death appeared to be unconnected with the operation.

Following the report by Baudeloeque and the discussion which ensued, the Society of Medicine of Paris made the resolution considering

1st - That it is demonstrated by experience that cases do exist in which delivery by the natural passages is impossible.

2nd - That in many of these cases, the Caesarean operation is the only means by which there is any hope of saving the mother and child.

3rd - That this operation, however dangerous it may be, has often been practised with success.

The Society of Medicine is "unanimously of the opinion that it is the duty of the physician to have

resource to the Caesarean operation in the cases determined by the Art. And in order to enable the learned as well as the public to form a judgment of the operation, which so nearly interests humanity, social order and the progress of the Art, the Society decrees:-

1st - That the Memoir of Citizen Baudelocque shall be printed in the next number of its Recueil Periodique with the Extract of the Report of the Sitting of this day.

2nd - That the Account of the delivery of the wife Marville (one of the cases mentioned by Baudelocque) and the Report of the opening of the body of this woman shall likewise be printed at the end of this Memoir.

3rd - That two hundred copies of this Memoir shall be taken in order to be distributed amongst the different administrative and judiciary bodies.

This Memoir was a very notable contribution to the obstetric literature of the time and was an effective reply to the ramblings of Saccombe and his anti-Caesarean school, to be described shortly.

Baudelocque's second memoir was a much shorter document, describing five cases and discussing the technique of the operation.

In the first two cases which were recounted, the patients had the benefit of a consultation of a large number of eminent accoucheurs prior to the operation, but both died.



In the third, a practitioner took upon himself the sole responsibility of performing the operation on a woman in a small hut in the centre of a forest. His only instrument was a blunt razor, and his assistants, the husband, another man who fled soon after the proceedings commenced, an old man and a little girl. Nevertheless the woman recovered from the operation, although the child was still-born. Commenting on this event, Baudelocque remarked "Perhaps I should have no more reason to blame it although the inutility of the Caesarean operation appears to me more clearly demonstrated in this observation than in its indisputable necessity. The success which followed this operation appears to me much less astonishing than the boldness of the surgeon who dared to run the risk of having sole charge of an event which is but seldom so fortunate."

In 1796, Baudelocque performed Caesarean section on a patient who had previously given birth to a full time child by the natural passages. Unfortunately the patient died on the third day. As a result, he was fiercely attacked by Jean Francis Saccombe, an eloquent, witty and prejudiced charlatan who, as founder of the anti-Caesarean school in Paris towards the end of the eighteenth century, occupies such a remarkable place in the history of Caesarean section that an account of his career and writings is worthy of attention.

Born in 1750 at Carcassone, he studied midwifery at Montpellier in France, and later, in England, under Hunter

and Osborne. On returning to Paris he set up in practice as an accoucheur and declared that he could deliver any woman by use of his hands alone and without resort to any instrument. He was especially antagonistic to those who favoured Caesarean section and spread his views by means of lectures, pamphlets etc. In one of these, he called Baudelocque a "murderer" for which offence he was fined 3,000 francs. Unable to pay he fled from the country but returned again in 1813, under the name of Lacombe. Having lost his obstetric practice, he endeavoured to make a living by selling secret remedies and writing poetry, but finally died in 1822, discredited and neglected.

To carry on his campaign he founded in 1798 his "Ecole Anti-Caesarienne." He gave lectures, and an annual festival was held at which his best pupil received a silver medal and had the privilege of embracing Mme. Saccombe. On one side of the medal was the figure of Hercules slaying the hydra, together with the inscription "no more Caesarean section". On the reverse was a beehive with flying bees and the words "Saccombe's anti-Caesarean school".

Sacombe was a prolific writer. His chief work was his "Elemens des Accouchmens" published in Paris in 1799. In it there was a portrait of himself, and he styled himself "Professor de medicini et de chirurgie des accouchmens " but did not hesitate to describe with contempt accoucheurs as "hermaphrodites" of the art" and as "murderers in breeches."

On the first page, heading an address to the citizen consul, is the badge of the school - a figure of a Caesarean hydra struck down "30 lumiere an VII" with the words "Ecole Anti-Caesarean" underneath. Of this monster he wrote "Born in the midst of the civil wars which desolated France towards the middle of the 16th century, the Caesarean hydra, attracted by the odour of human blood has again raised its hideous head amidst the scaffolds which crowned the soil of France at the end of the 18th centry." In a chapter in his book he gave twenty eight reasons why he believed Caesarean section to be impossible of success and unnecessary.

He called the operation ferocious, immoral and depopulating and made a slashing attack on Rousset, declaring that he was not a practising physician but a secret agent of Catherine de Medici who, he asserted, encouraged the performance of the operation on Protestant women in order to dispose of as many of these as possible.

He considered that healing of such a uterine wound as that necessitated by Caesarean section was impossible and declared that those who advocated Caesarean section did so for financial gain and self advertisement. He mentioned an operation, unsuccessful, performed by M.Coutouly, who asked the husband for his fee - 600 francs. "How much" asked Saccombe "would you Caesareanists take to deliver a woman when you want 600 francs for

disembowelling her?" He related that Coutouly received and was satisfied with 300 francs, the husband suggesting that a fee of 600 francs might imply he was paying the surgeon to make him a widower!

He ended his work by saying "My task is complete, I have avenged nature and consoled humanity in giving the death blow to the Caesarean hydra."

At the end of his first memoir, Baudelocque gave an account of a case of a woman with a distorted pelvis in which the anterior posterior diameter of the brim was  $2\frac{1}{3}$  inches. Saccombe declared that she would be delivered without the assistance of any instrument, and of a living child, on the grounds that nature which had given her the power to conceive would not refuse her the power to deliver herself. He added that, if he had published in his writings, that there did not exist any case in which a woman could not deliver herself, it was because he had not met with such, the existence of which he was now ready to admit. Eventually, Saccombe was compelled to make use of the crochet to effect delivery the woman dying five days later.

It was not, however, the writings of such as Saccombe that deterred surgeons from performing Caesarean section but the great mortality resulting therefrom.

German surgeons were of the same opinion as their French colleagues, all writing in favour of the operation, although it was not practised in that

country as frequently as in France.

Wiedmann, in 1779 published a valuable dissertation entitled "Comparatio inter Sectionem Caesaream et Dissectionem Catiliginous et Ligamentosum Ossium Pubis" which was frequently quoted by subsequent writers. In it, he described eight cases of Caesarean section, only two which were successful. The last of these was performed in 1759 upon the Countess of Cheiry by Zimmerman in order to deliver her of a "monstrous infant."

As will be seen from the proceeding pages, it is obvious that Caesarean section was a much more common operation on the continent of Europe, during the period reviewed, than in Great Britain, and with more success attending its performance. Indeed this was so until the advent of the new methods of Porro and Sanger.

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CHAPTER 1111800 - 1876- Caesarean section or  
Craniotomy?

During the first 75 years of the 19th century - prior to the introduction of the Porro operation in 1876 - the Caesarean section came to be performed more and more frequently, especially on the continent of Europe. It was also performed for the first time in the United States of America.

British practitioners, with few <sup>c</sup>ex<sup>n</sup>ptions, viewed the operation with disfavour. Destructive operations to the child, such as craniotomy were much more popular, and Caesarean section was most often done as a last resort - a terrible mortality amongst the mothers being the obvious consequence.

On the continent of Europe, obstetricians were much more ready to perform the operation, but their efforts were severely criticised in this country. Thus a reviewer in 1830, commenting on a Caesarean section with a fatal termination reported from Holland on a patient where the conjugate of the brim was  $2\frac{1}{2}$  inches, said, "In this case, we think that the operation was by no means called for, and in this country would never have even been thought of. It is possible that the child might have been extracted alive with the long forceps, but if not it would have been surely better to perforate the head, than to have recourse to a measure which ought never to be resorted to except when the lives of both mother and child are in danger." Again in a journal of 1840, we read "We have

repeatedly condemned the unjustifiable disregard of maternal life in various countries on the continent as exhibited in the readiness with which the medical men perform the frightful operation of Caesarean section. Not only in Germany and Holland but even in France, where the surgeons and physicians, to their credit be it said, are usually among the foremost to adopt any acknowledged improvement in all the departments of the healing art, is this operation far more frequently resorted to than with us but it is often undertaken under circumstances which every unprejudiced person, be he medical or not, will surely not hesitate to condemn." In 1860 we find the

following comment on the report of a fatal case "May we take the liberty of suggesting that in all probability the mother's life might have been saved had Caesarean section not been performed at all; but the head lessened and contracted by the crochet, craniotomy forceps, or turning? There certainly seems a wide discrepancy between the indications for Caesarean section in this country and in Germany."

In this case, the conjugate of the brim was estimated to be between  $2\frac{1}{4}$  and  $2\frac{1}{2}$  inches, but at the time of operation the patient was in a state of great exhaustion, and severe haemorrhage ensued owing to uterine inertia.

As always the most common cause requiring the performance of Caesarean section was contraction of the maternal pelvis and an excellent idea of the

opinion of the different schools of thought may be obtained by considering the degrees of contraction in which Caesarean section was deemed necessary.

Taking first the French view, Velpeau in 1829, recommended Caesarean section when the smallest diameter of the pelvis was less than 15 lines, whether the foetus was alive or dead, this being the "only chance of safety we can propose to the woman". He went on "When this diameter amounts to from 18 lines to  $2\frac{1}{4}$  inches, it is equally indispensable when we do not wish to act upon the child; but in this case, the child must be alive and further, it remains for us to decide whether it is better to follow the English doctrine and destroy the foetus than to expose the mother to the danger of losing her life. Lastly, it may happen that we shall be compelled to resort to it even although there should be  $2\frac{1}{2}$  or  $2\frac{3}{4}$  inches at the smallest passage provided the forceps, turning or section of the pubes shall have been deemed useless, or have been tried in vain." Commentary by an English writer on this statement was "Pity the poor French women, we say, who are entrusted to the tender mercies of such an accoucheur." (1843). Jacquemier, in 1846, declared that when the pelvis measured less than 2 inches in its narrowest diameter, Caesarean section was the only justifiable mode of delivery, even when the child was dead, and when the

measurement varied from 2 to  $2\frac{1}{2}$  inches, and the child was alive, he recommended the Caesarean section in preference to embryotomy, not only for the sake of the life of the child, but as perhaps not more dangerous to the mother than a protracted and difficult delivery by embryotomy frequently proved to be.

German writers held a very similar point of view. Thus in one of the best books on midwifery published in that country in 1842, we read that "When the smallest diameter amounts to only  $2\frac{3}{4}$  inches, the termination of labour is possible only by making an artificial passage, or by breaking up the child. The possibility of terminating it in the latter manner ceases whenever the small diameter amounts only to  $2\frac{1}{4}$  inches or less, and the Caesarean section is then the only possible mode of delivery, and that to which we must have recourse in all cases, whether the child be dead or not. If the contracted pelvis measures from  $2\frac{1}{4}$  inches to under 3 inches, then the Caesarean operation is indicated when the child is alive, while if the child is dead, perforation is to be had recourse to." Caesarean section was frequently performed on the continent under degrees of pelvic contraction in which delivery by craniotomy or other destructive operation was performed by British practitioners. In choosing in any case of contracted pelvis between

craniotomy and Caesarean section, continental practitioners considered the life of the child, as well as the probable degree of difficulty and danger likely to ensue to the mother from a painful and protracted delivery by embryulcia, as important points in influencing their decision between the two modes of delivery. In Great Britain, on the other hand, little or no weight was given to these points in coming to a decision in such a case. In fact, British accoucheurs never deemed themselves entitled to have recourse to Caesarean section unless the pelvic measurements were so much reduced as to prohibit the possibility of extraction of the child through them by embryulcia. With them the propriety of delivery by Caesarean section began exactly with that degree of pelvic deformity at which the possibility of delivery by embryulcia terminated.

It is of interest to observe the opinion of various British and American obstetricians upon this question, namely, the actual degree of pelvic contraction above which it was considered still possible to deliver by embryulcia, and below which it was deemed proper and absolutely necessary to perform Caesarean section. Thus Dewees of U.S.A., in 1837, expressed the view that there must be a space of 2 inches antero-posteriorly, and at least  $3\frac{1}{2}$  inches in the transverse diameter in order to extract per vias naturales.

Bedford, in 1844, did not believe it possible to extract a child by embryotomy where the antero-posterior diameter of the superior strait measured less than 2 inches "without subjecting the mother to severe hazard, provided the child be of ordinary size." He considered the operation would be one of great difficulty and danger even with a space of  $2\frac{1}{4}$  inches, and stated that he would "without hesitation, prefer the Caesarean operation if I had certain evidence that the child lived, to any attempt to extract it per vias naturales if the antero-posterior diameter measured less than  $2\frac{1}{8}$  inches."

But many other writers considered embryotomy possible through smaller measurements. Burns, in 1843, considered a space of  $1\frac{3}{4}$  inches in the short diameter by 3 inches in length sufficient, or if the child was premature and soft  $1\frac{1}{2}$  inches by  $2\frac{3}{4}$  inches, while Barlow (1822) thought delivery by embryotomy possible if the space available measured  $2\frac{1}{2}$  inches by  $1\frac{1}{2}$  inches. Campbell in 1833 wrote "Unless we have a clear space of 2 inches, or nearly so in the conjugate, and fully 3 inches in the lateral diameter of the brim, embryotomy must be abandoned as not likely to ensure the safety of the parent", while F. Ramsbottam expressed himself in 1844 in the following terms:- "I am quite convinced that unless there be at the brim  $1\frac{3}{8}$  inches in the

conjugate by  $3\frac{1}{2}$  inches in the iliac (diameter) or  $1\frac{1}{2}$  inches in the conjugate by 3 in the iliac, it would be useless to attempt delivery by vias naturales."

In such cases, he said "We ought to consider it a duty - however painful and appalling that may be - at once to propose the Caesarean section as the only means by which it is possible to save the mother's life, and as offering also the sole chance of safety to the child." Churchill's view, in 1855, was that "When from any cause, the antero-posterior diameter of the upper outlet, or the transverse diameter of the lower, is not more than  $1\frac{1}{2}$  inches, have recourse to Caesarean section," while Murphy (1862), was of the opinion that this operation was justifiable in the ovate deformity of the pelvis when the conjugate axis is less than two inches."

We see, therefore, that the highest authorities in Great Britain at this time fixed the degree of pelvic contraction in which the dimensions varied from 3 to  $3\frac{1}{2}$  inches in the long diameter as the lowest limit at which delivery by embryotomy could be performed, and below which it was always necessary to have recourse to Caesarean section with a normally sized infant.

Nevertheless, there were those who doubted whether in all cases of great deformity, embryotomy was the correct procedure even when it was possible. Thus Burns, (1843), pointed out that it was one thing to extract and another to extract safely in



extreme deformity. He declared that "we ought to be satisfied not only that we can bring through the child, but that we can do so without so much violence as must in all probability kill the mother" and added "I question much if extreme cases be not as dangerous to the patient as the Caesarean operation - they are certainly more painful."

C.S. Mills, an American surgeon, writing to R.P.Harris (1878), was even more decided in his opinions, saying "Having witnessed the fatal results in a great many cases of embryotomy, none of which have been made known to the profession, to say nothing of injury inflicted in the patient, entailing in many subjects a miserable existence to which death would be preferable, I am decided in the opinion that in most cases in which craniotomy or embryotomy is resorted to in consequence of physical deformity, the preferable operation, and least hazardous to both mother and child, would be gastro-enterotomy, resorted to as soon as its necessity is ascertained, rapidly performed, with as little exposure as possible of the abdominal organs, and vigilant attention to the patient afterwards."

The difficulty in performing delivery by embryotomy in cases of marked contraction of the pelvis was sometimes very great. Three cases may be cited. C.D. Meigs (1842) mentioned one in which the antero-posterior diameter of the brim was two inches. Many hours were occupied in breaking down the cranium

of the foetus, and between three and four hours were occupied in pulling with the crochet in order to extract. He "used all his skill and strength, returning at intervals." Thirty three hours elapsed between craniotomy and delivery. Hamilton (1840) described how, in a patient where conjugate at the brim measured little more than  $1\frac{1}{2}$  inches, he performed craniotomy at mid-night. He commenced his efforts to extract the child at half-past nine the following morning, but did not succeed until two o'clock in the afternoon, after which he was "carried home in a sedan chair exhausted". The mother recovered. In 1847 E. W. Murphy gave an account of a case of a similar kind. The conjugate of the brim was but  $1\frac{1}{2}$  inches. The head was perforated and the crochet applied with difficulty. After three hours work there was no advance. Further efforts were discontinued that night, but resumed the following morning. Great difficulty was experienced in applying the crochet, and craniotomy forceps of several types were tried, but found unmanageable in the small space available. The crochet was tried again, and eventually a firm hold was obtained. After two hours, part of the frontal bone was pulled away, but still the head had not advanced. Further efforts a few hours later, however, met with success, and eventually the child was with great difficulty delivered. The mother died a week later. Murphy added that had the case occurred in London he would have performed Caesarean section, but he did not consider the

circumstances suitable.

So prejudiced were British obstetricians against the performance of Caesarean section, that, scattered through the literature of the period under review (1800 - 1876), there are accounts of cases where the operation was not resorted to until the infant had been mutilated from below in a vain effort to extract it. Radford (1865), in his collection of cases of Caesarean section, mentions nine of such; a few may be described. G. M. Humphry (1856) performed Caesarean section on a patient where medical attendant attempted to perform embryotomy after she had been in labour for twelve hours. An arm was removed, but no further progress made. At operation the uterus was found to be ruptured, and the woman died 20 hours later. R. Greenhalgh (1866) reported a case of a woman with marked distortion of the pelvis due to rickets, and a breech presentation, in whom delivery was effected as far as the head. Even with the use of a perforator and a cephalotribe, efforts to complete delivery failed, and the body became separated from the head. When Caesarean section was performed, the uterus was found to be ruptured, and the foetal head discovered lying beneath the diaphragm. The patient died 31 hours after operation. R. Dyce (1861) mentioned a case where, after craniotomy had been performed, and the whole of the cranium and part of the base had been broken down, all

efforts to extract failed. The patient died 43 hours after the performance of Caesarean section. But even in France, where Caesarean section was so much more often resorted to, such tragedies occurred. Capuron, in 1849, describing four such, from which however, two mothers recovered.

More tragic still, but happily uncommon, were the cases where the mother was abandoned to die undelivered after attempts to deliver by embryotomy had failed. T. Radford described one of this kind in 1867. The patient was a primipara of 23, suffering from marked distortion of the pelvis due to rickets. A number of practitioners met and held a consultation. Caesarean section was suggested, but, by a majority, the proposition was overruled. The head was perforated, and a small portion of the cranial bones removed, following which attempts to extract by means of the crochet failed in spite of powerful traction. A further attempt, made 12 hours later, produced no progress. Caesarean section was again proposed, but again obstinately opposed. "The poor woman was then abandoned to die with a mutilated infant which had escaped into the abdomen through a rupture in the anterior wall of the uterus."

The general opinion amongst British obstetricians, with a few exceptions, to be mentioned shortly, was that Caesarean section was not justified if the child could be extracted by any other method. "The difficulty of determining whether the child can

or cannot pass after embryotomy is very difficult, and the practitioner, when there is doubt, is quite justified in first exposing the mother to the lesser danger only." Commenting on such a doctrine, a reviewer in 1843 wrote "Long may our countrymen continue to act on this principle. Where are the circumstances that can ever warrant the certain endangerment, nay, often the more probable sacrifice, of a mother's life for the chance - and be it remembered it is nothing more - of preserving that of her child? How few of the children that "have been ripped from their mothers' belly like the Thane of Cawdor" have been reared? And then think what a miserable end for a poor creature, after undergoing the sharpest pangs that flesh can know, to be subjected to a painful and bloody operation, not for her own, but for another's possible advantage? Every principle of humanity and religion and physiology condemn it. Why then, it may be asked should practitioners abroad have recourse to it with so little hesitation? The answer is simple, and will at once be surmised by those who are at all acquainted with medical practice on the continent, and more especially in France. Patients, at least those amongst the poorer classes, seem to be regarded, not so much as fellow creatures that have the same hopes and fears, and the same feelings and desires as ourselves, but rather as objects, so to speak, of natural history, which the learned doctor

has to speculate and experiment upon."

Craniotomy upon a living child was considered justifiable, but voices were raised in protest against such a dreadful procedure. The advocates of such declared that the unborn child had no sensation of pain or feeling, but Sir James Y. Simpson (1855) asked wherein lay the difference in destroying a child an hour before its birth, and one hour after.

"Assuredly no man would consider himself justified on any plea whatsoever in perforating and breaking down, with a pointed iron instrument, the skull of a living child an hour after birth, and subsequently scooping out its brain. But is the crime less than when perpetrated an hour before birth? Modern physiology has fully shown that there is no such distinction between the mental and physiological life of an infant an hour before labour is terminated, and an hour after it, as to make any adequate distinction between the enormity of the act, as perpetrated at one or at the other of these two periods. And as if to add to the horrors of craniotomy when performed upon a living infant, some authors, - and among them even the very latest - tell us that whatever doubts may have existed as to the child being alive or not at the time of operating, the results of the operation itself will decide the point; for it if be alive at the time of the deadly perforation of its scalp, skull, and brain, this fearful fact will be revealed to the practitioner by warm and fluid streams of blood pouring along his

fingers and hands before any masses of broken brain escape, or the reverse." "Or is it more true", he asked, "that he who accelerates death is held responsible for having caused death in cases of greatly depressed vitality in women from disease, in which cases Caesarean section is performed, than it is in cases of equal depressed vitality from disease in which craniotomy is performed?"

The remarks of G. S. Bedford (1844) were even more forcible. In a footnote in his translation of Chiari's Midwifery he said. "The Caesarean section is undoubtedly a dread alternative for the accoucheur to choose; but I cannot agree with Dr. Chiari that it's fatality is so great as he represents; nor am I disposed to adopt the opinion (unfortunately too general), that craniotomy is always to be preferred to the Caesarean section; in truth it needs some nerve, and, for a man of high moral feeling, much evidence as to the necessity of the operation, before he can bring himself to the perpetration of an act which requires, for his own peace of mind, the fullest justification. The man who would wantonly thrust an instrument of death into the brain of a living foetus, would not scruple, under the mantle of night, to use the stiletto of the assassin; yet how often has the foetus been recklessly torn from it's mother's womb piecemeal, and its fragments held up to the contemplation of the astonished and ignorant spectators as a testimony undoubted of the operator's



skill. Oh, could the grave speak, how eloquent, how momentous, how damning to the character of those who speculate in human life, would be it's revelation."

Thomas Radford of Manchester, who, in his day, was the champion of Caesarean section, strongly denounced craniotomy as an operation of election, as early as 1843. Born near Manchester in 1793, after studying in Manchester and London, Radford became, at the early age of 25, surgeon to the Manchester and Salford Lying-in Hospital. In 1854 he gave the first obstetric address to the Provincial, later British Medical Association. His memory is perpetuated for all time in the splendid Radford Library and Radford Museum, now housed in the University of Manchester. He died in May 1881, aged 88 years. As time went on, he became more strengthened in his convictions, and in 1865 he wrote "The destruction by craniotomy of a number of infants in different women in successive labours, both in the practice of other obstetricians as well as those which happened to myself; the ignorant and groundless adoption of this operation; the unprofessional and disgraceful manner in which I have known it performed (in one case, the head was opened by a pair of scissors which were obtained from some part of the family; in another case, by a penknife); and the operation being frequently performed without a consultation - these circumstances, and deep reflection on the social and moral right to destroy life, convinced

me that the present recognised practice in these cases ought to be modified." In a later edition of his book he mentioned a case described by A. R. Simpson (1880). He (Simpson), declared that he knew of a doctor in the Lake District who perforated a head with a pocket knife, and extracted with a hook hastily manufactured by a smith who lived in the neighbourhood. The child, incredible to relate, was born alive and survived. Keiller, quoted by Simpson, described a similar case where the practitioner in attendance performed craniotomy with "a common pair of cobbler's pincers". Unfortunate results followed which led to "legal investigation" and "very disagreeable consequences."

Much was written, and there were many discussions about this time, concerning the relative merits of Caesarean section and craniotomy, in cases of contracted pelvis. There were those, such as Greenalgh (1866) and Kindead (1880) who maintained that the dangers of embryotomy in the more extreme degree of contracted pelvis were as great, if not greater than, those of Caesarean section. Barnes (1866), however, did not agree, and suggested induction of labour, followed by craniotomy, for such cases. He considered "that in craniotomy properly performed, we possessed a means of still further pushing aside what he found we must yet regard as a forlorn hope - the Caesarean section." Those who were in favour of craniotomy endeavoured

to show that the mortality following craniotomy was much less than that following Caesarean section. Churchill's (1855) statistics were frequently quoted. He gave the mortality from craniotomy as about one in five. Incidentally, he stated, that British practitioners resorted to craniotomy once in 219 cases, whilst for France, the figures were one in 1,205 cases, and for Germany, one in 1,944 cases. As regards Caesarean section, he collected 321 operations since 1750 from which 149 mothers recovered; and in 187 cases where the result is mentioned, 130 children were saved, and 57 lost. Churchill's statistics for craniotomy were supported by Tyler Smith (1860), Hodge (1866) and others, but Hicks and Phillips (1876) reanalysed these statistics and showed that the deductions were incorrect. They showed that no care had been taken to separate the operation as a cause of death from the disease which demanded the interference, and they rightly argued that if the obstetrician was forced to open the head to hasten delivery in a case of rupture of the uterus, and the woman died, she perished, not from operation, but in spite of it. They pointed out that the mortality from craniotomy varied greatly with the degree of deformity of the pelvis. In cases of moderate contraction the operation was a simple one, but as the deformity increased, it became increasingly difficult and dangerous. It was obviously therefore, grossly unfair to compare the mortality of Caesarean

section with that of all cases of craniotomy.

Parry's statistics were nearer the mark. In 1872, he collected 70 cases where craniotomy had been performed in women with a conjugate of  $2\frac{1}{2}$  inches or less. The mortality was over 38 per cent. In six of the cases, all of whom died, craniotomy failed to effect delivery, and recourse had to be made to Caesarean section.

We have already seen that Denman was one of the first to throw doubts on the propriety of repeated craniotomies performed on the same patient. C.D.Meigs, of America, supported this view, and was one of the first to act on it in his country, in the celebrated case of Mrs. Reybold. This woman, of Irish nationality, was found at her first confinement in 1831, to have a marked distortion of the pelvis, owing to rickets. A consultation was held, and Caesarean section proposed, but most strongly opposed by the majority of the distinguished surgeons present, as they believed a fatal termination inevitable. After the patient had been in labour for 64 hours, the head was perforated, but extraction not completed until a further 33 hours had elapsed. Two years later, the same procedure was repeated, whereafter Meigs informed his patient that, under no circumstances, would he repeat craniotomy upon her child. After another two years, she was again at the end of her third pregnancy, this time under the care of J. G. Nancrede (1835- & 1838). When labour

ensued, Caesarean section was suggested, but the patient refused to consent. Eventually she did so, and made a successful recovery. In 1837 - after a lapse of two years - she again underwent Caesarean section and recovered as before.

Commenting on such action, Playfair (1878) remarked "He would be a bold man who would deliberately elect to perform Caesarean section on such grounds", but Harris (1878) replied, that he was "happy to answer that we have had several such bold men, and that they were repaid in a remarkable manner by success."

Religion, too, played a large part in deciding the procedure to be adopted in doubtful cases. As has already been stated, in Catholic countries, it was taught that the child's life should be saved if at all possible, in order to ensure that it received baptism. For this reason, practitioners in Catholic countries hesitated to perform craniotomy on a living child, preferring to perform Caesarean section. Thus, Kinkead, of Dublin, in 1880, said "before birth the child is just as much a living distinct individuality as it is after. It has a perfect right to its life, as its mother has to hers. We are equally bound to save its life, if we can, and we ought not only to dare, but it is our bounden duty to put its life - that of an unborn child - into the scale against that of a being like ourselves, accountable to the Almighty. He declared that the question of the value

of one life over another could not be entertained - "We are not the judges of which is most valuable; if we entered on this course, how wavering would be our decision, how uncertain our action, how many perplexing and disturbing circumstances would arise. We would be taking upon ourselves the arbitration of life, the functions of the Supreme Judge." --- He held that craniotomy should never be performed unless it was certain that the mother's life would be spared, and that she would not be placed in as great peril as she would from undergoing Caesarean section.

Robert Barnes (1886) was one of those who strongly opposed Caesarean section, looking on it as the "reproach of surgeons, being a confession that their art was baffled." Concerning the propriety of repeated craniotomy, of which he fully approved, he wrote "the conduct of the woman is assumed to be culpable, and we are assumed to be in the position of accomplices, or abettors in her fault, if we repeatedly relieve her by craniotomy. But are we entitled to take upon ourselves the office of the Judge? Are we to make ourselves the ministers of justice? Vengeance, punishment is not ours. When did Medicine ever withhold her merciful hand from the degraded, the sinful, the criminal? Shall we dare to put a mere vegetative life - that of an unborn child - into the scale against that of a being, like ourselves, accountable to



the Almighty? Can we take upon ourselves the awful weight of deciding that the wretched woman was wrong - criminal - in becoming a mother? She is subject to her husband. If punishment is due, must it fall upon her? Are we to inflict it? I cannot, therefore, hesitate in expressing my conviction that we should be traitors to our trust if we were to perform the Caesarean section when craniotomy is safer for the woman, because, in our judgement, she was culpable in becoming a mother. The final argument is that it is the mother's inalienable right to be rescued, even if that involve the sacrifice of her child." This point of view was strongly opposed by Radford (1865) who asked "whether it was not of equal importance that the obstetrician should observe the Mosaic Law 'Thou shalt do no murder?' He strongly disagreed with the value set by Barnes upon the life of the unborn child, saying "When the destruction of the infant by craniotomy is contemplated, do we really consider the great social evil we may commit by destroying an infant in utero?" "Suppose the head of Shakespeare had been opened, what would have been the loss to society." "The low estimate which is held of the life of the unborn infant has led to a most unwarranted abuse of the perforator and crochet."

So the argument went on. The majority of British practitioners preferred craniotomy to Caesarean section, the latter being performed only as a last resort. As late as 1891, Garrigues of New York stated



that he considered craniotomy on a living child preferable to Caesarean section, as affording, in most cases, a greater degree of safety to the mother. He quoted statistics from the work of Leopold, who had performed 92 craniotomies without a maternal death, but had a mortality of 8.per cent following Caesarean section. Like many of his predecessors, he did not analyse his statistics with sufficient care, and chose to ignore the circumstances under which the two procedures were rendered necessary. In support of his view, he pointed out that many of the cases occurred in the poorest classes, a large proportion of whose children died in infancy, and that the life of many of the survivors was a misery. His views were strongly opposed by R. A. Murrar, who rightly pointed out that the general condition of the patient ought to be considered before arriving at a decision, and mentioned a case where the operator spent three hours in effecting delivery after perforation. The woman recovered, but was left with a torn vagina, a lacerated cervix, and infection which left her "worse off than if she had been dead."

The frequency with which craniotomy was performed in Great Britain was a great blot on midwifery practice in that country. The figures indicated a destruction of foetal life which we cannot look back to without a shudder, and justified the reproaches cast on British obstetricians by their Continental and American brothers. Fortunately there were those such

as Radford, who protested against such a practice and played a great part in influencing professional opinion towards a change for the better.

The "high forceps" operation was frequently performed during this time, but an American writer, Harold Williams (1879) of Boston, U.S.A., endeavoured to prove that this was an even more dangerous operation than Caesarean section. Between 1858, and 1878, he collected 244 cases, in 125 of which Caesarean was performed and in the remaining 119, forceps were applied to the foetal head whilst it was still above the pelvic brim. His tabulated results (abridged) are here reproduced:-

TABLE 1.

	No. of Mothers		Percent.	Child.		Childs	Result
	cases.		maternal	lived.		fate	to
	died.		deaths.	died.		unknown	mother
						or dead	un-
						before	known.
						operation.	
C.S.	125	61	48.8	81x	17	29	0
H.F.	119	45	39.47	42	68	9	5

x Twins in 2 cases.

TABLE 2 see over:-

TABLE 2

showing results where operation performed within 40 hours from the commencement of labour or within 30 hours after rupture of the membranes:-

	No. of cases	Mothers died.	Percent. maternal deaths.	Child lived	Child died	Child's fate un-known or dead before operation.	Result to mother un-known.
C.S.	44	15	34.08	35	4	5	0
H.F.	54	17	31.15	20	29	5	0

Excluding from Table 2, cases with serious complications such as ante-partum haemorrhage, cancer, albuminuria etc., the results were remarkable.

From Caesarean section, 73.69 per cent. of mothers recovered and 91 per cent. of the children were saved whilst the figures for the high forceps operation were 69 per cent. and 41.67 per cent. respectively.

Excluding from the same table, cases where delivery by craniotomy, cephalotripsy, perforation or version had previously been attempted, 75.68 per cent. of mothers and 91, 18 per cent. of children were saved by Caesarean section whilst the figures for the high forceps operation were 82.4 per cent. and

66.6 per cent. respectively. When labour had been in progress 24 hours or less, the maternal mortality from Caesarean section was 20.6 per cent. compared with 30.3 per cent. with the application of high forceps.

From these statistics, Williams concluded that the results to the mother from the application of high forceps were more fatal than from Caesarean section, while the results to the child were much more fatal.

Whatever the merits of the arguments concerning the relative dangers of craniotomy and Caesarean section, there is no doubt that, prior to the introduction of the techniques devised by Porro and Sanger, the mortality attending the latter operation was very great. Brief reference has been made to this subject but it may now be further considered.

C. Kayser (1844) of Copenhagen, in his valuable dissertation entitled "De eventu Sectionis Caesarea", stated that out of 338 cases on record, the recoveries were but 128, representing a mortality of 62 per cent. His cases covered the period from 1750 to 1839. He chose this period because, in common with other writers, he doubted the authenticity of many of the earlier cases. Taking the results from the reports of the lying-in hospitals, in which concealment was impossible and failure was necessarily as

notorious as success, he found that out of 67 cases, there were only 14 recoveries, a mortality rate of nearly 80 per cent. He pointed out that it could be fairly assumed that, in these institutions, the patients would be more ably treated than elsewhere; that the best obstetric and surgical skill would be available, both at the time of the operation and during convalescence and that the most opportune time for operation would be chosen. In view of these facts, it would be reasonable to expect a greater degree of success than elsewhere but such was not the case. The only possible explanation appeared to lie in the supposition that a great number of fatal cases occurring in private practice were never reported.

In Kayser's cases, the maternal mortality from 1750 to 1800 (117 cases) was 68 per cent., from 1801 to 1832 (148 cases) 63 per cent. and from 1833 to 1839 (71 cases) 49 per cent. It is pleasing to note the improvement.

He also showed that the longer the mother had been in labour, the worse was the prognosis for her. For patients who had been in labour 72 hours or more, the mortality rate was 72 per cent., while for a lesser period, it was 61 per cent. The foetal mortality where labour had been in progress for three days or more, was 60 per cent., while when the operation was performed during the first 24 hours of labour, it was but 20 per cent. The length of time elapsing between rupture of the

membranes and performance of the operation also influenced the foetal mortality. When it was 6 hours, or less, the rate was 14 per cent., whilst it increased to 22 per cent. when this period was between 6 and 24 hours, and reached 49 per cent. when the period exceeded 24 hours. Regarding the cause of the mothers' death "inflammation" appeared to be the most dreaded consequence of the operation, 77 of 123 of the fatalities being due to this.

This last statement was confirmed by West (1851), who made an analysis of 147 fatal cases of Caesarean section. He found that "inflammation" was the commonest cause of death - 56 cases - followed by "shock to the nervous system" - 33 cases. Other causes were haemorrhage - 14 cases, haemorrhage and shock - 9 cases, haemorrhage and inflammation - 18 cases, shock and inflammation - 11 cases, while in only 6 cases was death ascribed to causes independent of the operation. Most of the cases died between the first and fourth days following operation, 114 deaths occurring during this period.

Churchill (1855) collected from 1750 to 1855, 321 cases from which 149 mothers were saved and 130 children out of 182, in which the result to the child was known. He also quoted Figuiera as collecting 790 cases, 424 of which were attended with a fatal result to the mother.

A much more optimistic note was struck, however, by M. Pehan Dufeillay (1862), a French obstetrician,

who collected from 1845 to 1861, notes of 88 cases from which 50 women recovered, and concluded that death in many of the cases was in no way connected with the operation and that, under favourable circumstances, the mortality rate should not exceed 25 per cent.

Schroeder (1873) quoted Mayer as having collected, from all countries, 1,605 operations with a mortality of 54 per cent., but his figures are quite unreliable. He declared that, up to about 1870, 480 Caesarean sections had been performed in England! When we find that Radford (1865) up to 1865 collected only 77, no more need be said concerning the validity of Mayer's statistics. To the same time, he appeared to have heard of only 12 cases in U.S.A. From Germany, concerning which country his figures may be more reliable he collected 712 operations with a mortality of 53 per cent., and from France, 344 with a mortality of 55 per cent.

While the various statistics and mortality rates given by different writers vary considerably, there was no disputing the fact that the operation was attended by a much greater mortality in Great Britain than on the continent of Europe and in America. Thus Churchill, in 1855, collected 371 cases from the continent of Europe from which 217 mothers recovered. While some doubt may be cast on such a large proportion of recoveries, there can be little concerning the statistics from U.S.A., collected with such



painstaking care by R. P. Harris (1878). In that country, he found 71 cases up to 1878, from which 34 mothers recovered and 32 children were saved. In Great Britain, on the other hand, up to 1865, Radford found but 11 recoveries from 77 operations. In a later edition of his book (1880), he increased the number of operations to 131 from which but 23 mothers recovered.

Some of the early writers discussed, at great length, the difference in the results of the operation in the different countries. Thus Campbell (1833) pointed out that with few exceptions the operation had been undertaken in Britain on subjects in a most unfavourable condition from their being reduced by disease such as malacosteon and other afflictions which, in themselves, frequently progressed to a fatal termination in a short time, without the super-added strain of a severe operation. Again many of the patients were not operated upon until they had been in labour many hours, sometimes several days, by which time they were in a state of great weakness and exhaustion. He also believed that the "stimulating regimen", too frequently indulged in, in Great Britain, contributed to no small degree in swelling the list of fatal cases.

This last point of view was supported and repeated by Harris in 1880, who in a comparison of the mortality from the operation in U.S.A.,

and in Britain, declared that the much heavier mortality amongst British women was due to the fact that they were, in a large measure, unfit to endure the operation. The great factors of the disqualifying condition, he believed, were poverty, want of proper nutrition, the existence in many of the cases of malacosteon, (a rare disease in U.S.A.) and finally, the habitual drinking of beer and gin. He stated that it was a well known fact that heavy drinkers, especially beer consumers, were bad subjects for operation, adding that, in America, the women who were required to undergo Caesarean section were rarely heavy drinkers, but that this was far from being the case in England. In support of this argument, he drew attention to the much better results obtained at the London Temperance Hospital than elsewhere in London.

On the continent, on the other hand, declared Campbell, the operation was performed under very different circumstances. Firstly, it was frequently performed in cases in which, according to the British teaching, it was not required, and in patients enjoying a very different state of health from those who were the subject of operation in Britain. Again, the operation was never so long delayed on the continent, for there was not that dread of operating there, nor "such a high estimate of human life". Campbell also suggested that the simpler mode of living in continental countries tended to better results from the operation and finally, he doubted the authenticity of some of the reports from

there, especially those of repeated Caesarean section on the same patient.

While such factors as these did affect the mortality of the operation in different countries, there can be no doubt that the chief cause of the great mortality in Britain was reluctance on the part of surgeons to perform the operation until every other method of delivery had been tried. Such a doctrine could produce no other results.

Blundell (1834) was another writer who doubted the accuracy of the mortality rates from the continent, suggesting that it was highly probable that many of the failures there had not been reported whilst, in Britain, "through the liberty of the press", such was not likely to occur. Apparently he had no great opinion of the religious attitude to the operation as practised on the continent. He said "Moreover, should our planet meanwhile escape some of its former catastrophies, posterity will, probably, learn with surprise, some thousand years hence, what have been the opinions relating to these points, maintained by their predecessors. They may learn with surprise, not unmingled with indiscreet levity, that a large and religious body of their civilised forefathers had been of an opinion, not to be presumptuously touched, that if one of the children of our great Parent were permitted to perish in utero, without the administration of water and words, in consequence of an original and unexpiated moral taint, derived from our common ancestor, eternal perdition would

probably be its portion. Happily, however, as we are in another and better system of opinions, we are not at all surprised to hear that by many, such a notion has been deemed both wholesome and tenable; and some tender mothers, who, with safety to themselves, might perhaps have been delivered by the natural passages, in this hope of securing to their children the baptismal advantages, have, with constitutions on the whole healthy enough, been induced to submit, in preference, to an extraction of the foetus, early in the labour, by means of the Caesarean incision."

The views expressed by Campbell and Blundell were generally supported by other obstetricians. Thus Ramsbotham, in discussing the discrepancy between the results obtained by British practitioners and their brethren on the continent, did not consider that the differences in climate, as advocated by Simmons many years before, could be held responsible, nor could it be asserted, in his opinion, that continental operators were the more skilful. Earlier operation, and the better condition of the patient were, in his view, the vital factors. Like Blundell, he considered that religious practice was responsible for the more frequent performance of the operation on the continent, saying, "The fact is not to be concealed that in different parts of Europe, and especially in Roman Catholic countries, both has this operation many times been had recourse to under circumstances in which no British practitioner would have considered himself warranted in proposing it -

where indeed, there has existed sufficient available space in the pelvis to admit of the extraction of the foetus per vias naturales; and also that the women, more under the influence of their clerical pastors than ours are, have more readily and cheerfully submitted, from a sense of religious duty, to this dreadful expedient, while they still possessed considerable strength that they might not deprive their unborn children of the benefit of admission within the pale of the Christian church."

## Chapter 111

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Several years ago in 1768 published in Florence, a paper  
 entitled "Medical-Obstetrical experiments in the  
 successful retention of the uterus in certain cases."  
 etc. He described several experiments, and  
 says, amongst others, "to be the first to  
 remove the uterus containing nine foetus. The result  
 of saying, "All whom I have seen have been  
 released. I do not doubt that the uterus is not  
 all necessary to life; but whether it may be preserved  
 and with impunity from the human body, we cannot be  
 certain without a further series of experiments."  
 This kind which perhaps a more fortunate  
 will obtain."

CHAPTER 1V

The year 1876 marks the commencement of the third era in the history of the operation of Caesarean section, for, in that year, a new technique was evolved which was called the Porro operation, after its inventor, Professor Porro of Pavia. This operation consisted in Caesarean section, followed by removal of the uterus and its appendages, including the ovaries, leaving behind only the cervical portion of the uterus. But others, many years before Porro, had considered this method of operating.

The first to arrive at the conclusion that recovery might be expected to follow removal of the gravid uterus with its contents, was Dr. Joseph Cavallini, who in 1768 published in Florence, a paper entitled "Medico-Chirurgical experiments in the successful excision of the uterus in certain animals etc." He described several experiments on dogs and sheep, amongst them, one in a dog in which he removed the uterus containing nine pups. He ended by saying, "All which things having been duly weighed, I do not doubt that the uterus is not at all necessary to life; but whether it may be plucked out with impunity from the human body, we cannot be certain without a further series of experiments of this kind which perhaps a more fortunate generation will obtain."

Dr. G. P. Michaelis of Marburg suggested the

the question of amputation of the uterus, after removal of the foetus, in 1809. In a footnote to an account of a case of Caesarean section published by him in Siebold's *Lucina* of that year he defended the use of large doses of opium in his after-treatment on the grounds that violent reaction was the greatest danger. He pointed out that where in ignorance, the uterus had been cut away, this reaction had been made less and added "It is indeed a question whether the Caesarean section would not be made less dangerous if, with it, were combined the extirpation of the uterus, an organ which is after all, under such circumstances (as these namely which demand the Caesarean section) nothing but harmful."

Dr. James Blundell in his lectures on obstetrics at Guy's Hospital in 1828 said "In speculative moments, I have sometimes felt inclined to persuade myself that the dangers of the Caesarean operation might be considerably diminished by removal of the uterus. Perhaps this method of operating may prove an eminent and valuable improvement." Repeatedly in his lectures, and successive editions of his book on obstetrics, he urged the adoption of this change in the method of operating because of his confidence in its greater safety. It is somewhat remarkable, in view of the great mortality of the old operation in Great Britain, that no surgeon in this country ever tested the value of his suggestion. By living to a very advanced age, (he died in 1878 at the age of 87) this learned obstetrician found that his views were proved to be

correct in another land. Blundell, himself did not operate on a woman in the manner which he suggested, confining himself to experiments on animals. He removed the uterus from four rabbits, three of which recovered; the fourth died owing to slipping of the ligatures.

Others who performed similar experiments on animals were Feser, who in 1862, saved two bitches out of four, following uterine amputation. Fogliata of Pisa, who in 1874, saved three bitches out of four after removal of their non-gravid uteri; Porro himself, who, in the same year and without knowledge of Fogliata's experiments, removed the uterus from three pregnant rabbits, all recovering, and Rein of St. Petersburg.

While these experimenters, Cavallini, Michaelis, Blundell, and Fogliata, all recommended a trial of entire extirpation of the uterus as a means of lessening the mortality after Caesarean section, it was Porro who carried it out and evolved the technique.

Porro was not, however, the first to remove the gravid uterus in a living woman. This had already been done in America by Dr. Horatio Storer of Boston, U.S.A., in 1869, but his operation was one of necessity rather than one of election. He was compelled to do so owing to severe haemorrhage occurring, and which he could not otherwise control, during the performance of Caesarean section on a patient with a fibro-cystic tumour of the uterus. She had already been three days in labour -

the foetus was macerated and the woman died 68 hours after the operation.

Porro was led up to his bold proposal by a consideration of the conditions under which the Caesarean section had been so uniformly fatal. In his own city of Pavia, for example, no woman who had been subjected to this operation had survived. He himself operated in July 1871, in Milan, on a young primipara with a distorted pelvis, due to rickets, after she had been twelve hours in labour. The child was saved but the mother died fifty hours later from internal haemorrhage and peritonitis (Harris 1886). Porro therefore determined to modify the operation in the hope of diminishing its dreadful mortality. It appeared to him that the chief source of danger lay in the wounded uterus, which was sometimes the source of a fatal haemorrhage. In whatever manner the lips of the incision in the uterus might be brought together at the time of the operation, they were liable, in its changing moods during the puerperium, to become separated. This might lead to an escape of blood, not immediately dangerous in itself, but in its liability to escape into the peritoneal cavity where it sometimes set up peritonitis, frequently fatal. The usual puerperal secretions from the uterus were also liable to escape into the abdominal cavity. The risk of peritonitis was further increased by the danger of infection passing along the genital passages and through the gap in the uterine wall, and so into the

peritoneal cavity. It seemed to Porro that all these risks would be greatly lessened, if not entirely removed, by removal of the injured organ; the wound surface of the uterine stump would not be so great as that of the necessary incision in the uterus; the stump would be amenable to means of controlling haemorrhage that had given such good results in the removal of ovarian and uterine tumours through the abdominal wall. Fortified by such considerations and by the success of experiments, made by himself and others, on animals which showed that more recoveries took place when the wounded gravid uterus was removed than when it was left, after the foeti had been removed by Caesarean section, Porro carried out his idea with success on 21st May, 1876.

His patient was a primiparous dwarf, twentyfive years of age and, by a curious coincidence, of the name of Cavallini. She was only 57 inches in height and had a markedly distorted pelvis due to rickets, the antero-posterior diameter of the pelvic brim being estimated at  $1 \frac{9}{16}$  of an inch. She was in hospital under observation for twenty four days prior to operation which was undertaken after labour had been in progress for seven hours. Chloroform was administered and Porro and his assistants washed their hands in a dilute solution of carbolic acid. The uterus was opened in situ and the child removed, alive. After removal of the placenta, an instrument called a Cintrat's constrictor was passed over the neck of the

uterus so as to include both ovaries and Fallopian tubes. This instrument, in principle, was very similar to a modern snare as used for removal of nasal polypi. The wire was sufficiently tightened to control the haemorrhage and the uterus was then cut away; the abdominal cavity was next cleaned out with carbolised sponges and drainage tubes passed through the abdominal wound and pouch of Douglas and out through the vagina. The stump or pedicle was brought out through the abdominal wound which was closed with sutures of silver wire. The stump was touched with perchloride of iron and the whole of the constrictor apparatus left outside the wound, but still on the stump, under the dressing, for four days, being fixed in the lower angle of the wound. The abdominal sutures were removed <sup>after</sup> one week, the strangulated portion of the pedicle sloughed off at the end of another seven days and the patient was "cured" in forty days. In the same year Prof. Porro published his famous memoir entitled "Della Amputazione utero - ovarica come complemento di Tiaglo Casereo" and from that time, the operation has been known as the Porro operation.

The early results obtained from this new method of operating were not however encouraging. In the early months of 1877, it was performed by Prof. Inzana of Parma, Italy (Godson 1884) by Prof. Hegar of Freiburg, Germany (1879), and by Dr. Previtali of Bergamo, Perotio (1879) Italy,



but all three patients died although two children were saved. These results were not altogether surprising when the reports tell us that the first of these suffered from osteo- sarcoma of the pelvis, the second from rickets and also eclampsia, and the third had been in labour five days before operation. Nothing daunted, however, Professor Spath of Vienna and his colleagues, Professors Carl and Gustav Braun, decided to adopt it, recognising the value of the procedure and well aware of the high mortality of the old operation, both in his country and elsewhere. Later in 1877, Prof. Spath performed the operation successfully on a woman of 40 who suffered from malacosteon and who had an antero-posterior diameter of the brim of  $2\frac{5}{8}$  inches. She was in hospital nearly four weeks prior to operation. Thereafter, the operation was performed more frequently, and in 1884 Clement Godson was able to present a table of 134 Porro operations.

In Belgium and Switzerland it was first performed in 1878, in France in 1879, in Russia and U.S.A., in 1880, in Scotland, by A.R. Simpson, in 1881. The first successful case in the United Kingdom was that of Godson (1884) who operated upon a dwarf of 24 years of age, with an extremely distorted pelvis, the result of an accident in childhood, on 27th November 1882. Godson's tables are, therefore, reproduced:-

TABLE 1

showing number of cases in each country with results.

Country.	No of cases.	Result to Mother.		Result to Child.		Percentage Maternal Mortality.
		R.	D.	R.	D.	
Italy.	53	23	30	45	9	56.6
Austria.	30	18	12	29	2	40.0
Germany.	21	6	15	15	6	11.43
France.	12	5	7	8	4	58.3
Great Britain.	5	1	4	4	1	80.0
U.S.A.	4	1	3	3	1	75.0
Belgium.	4	2	2	4	0	50.0
Switzerland	2	2	0	1	1	0
Spain.	1	0	1	0	1	100.
Holland.	<u>1</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>
	134	59	75	111	25	55.97

TABLE 11

showing number of operations each year with  
results to mother.

Year.	Total.	Recovered.	Died.	Maternal Mortality %
1876	1	1	-	0.
1877	7	1	6	85.7
1878	15	7	8	53.3
1879	17	10	7	41.2
1880	32	12	20	62.5
1881	21	8	13	60.0
1882	24	10	14	56.5
1883 ) 8 months)	17	10	7	35.7

Professor A. R. Simpson of Edinburgh was the first British obstetrician to perform the Porro operation in the United Kingdom. He was assisted at the operation, which took place on 21st February 1881, by Dr. (later Sir) Halliday Croom, Dr. Berry Hart and Dr. F. M. Caird, a truly formidable array of talent. The patient was 24 years of age and had previously given birth to five children, all of whom had perished in consequence of prolonged and difficult labour, the result of contraction of her pelvis. Simpson himself had attended her in her previous confinement and before he could effect delivery, found it necessary to trephine the skull and crush it with Gruyon's apparatus. The patient died three days after the operation as a result of peritonitis.

In the United States of America, the first Porro operation was performed on 8th April 1880, by Isaac E. Taylor of New York but the patient died on the twentyfifth day, after apparently going on well, as a result of pulmonary embolism following phlegmasia alba dolens and moving about when told not to. She was a kyphotic dwarf, the result of an injury in childhood. Elliot Richardson (1881) who operated the following year was more fortunate, his patient making a good recovery, the first successful Porro operation in America.

Of Godson's collection of 134 cases, 88 were in need of operation owing to contracted pelvis due

to rickets and 25 as a result of malacosteon. In the fatal cases the commonest cause of death was peritonitis, 36 cases, followed by shock, 16 cases, and septicaemia 9 cases. The death rate is very high but it must be stated in all fairness, that only 77 were in a state described as favourable prior to operation; of these 31 died, a death rate of 40 per cent. "Listerism" was adopted in 67 of these 77 cases, in which the death rate was 36 per cent. In many of the fatal cases, the patient was exhausted by prolonged labour, eclampsia and such like.

Nevertheless, these figures were a great improvement, at least in some countries, on the results obtained before the introduction of the Porro operation. In the Vienna lying-in hospital during the previous 100 years, not a single woman had recovered after Caesarean section. In Italy, out of a series of cases operated upon by Chiara, Porro and others, there were only 3 recoveries out of 62 cases (Harris 1880). From 1787, until the first successful Porro operation by Prof. Tanier on May 20th, 1879, every Caesarean case in the Maternite of Paris had proved fatal. In Great Britain of 77 cases collected by Radford (1865) up to 1864, 66 mothers perished. In U.S.A., where the operation was not favourably received, the maternal mortality from the old Caesarean section was 43 per cent, while but one mother out of four was saved in the first four Porro operations and six out of the next fourteen. In 1879 Harris wrote "we are not now prepared to

recommend it as a substitute for the true Caesarean section. To recommend the Porro operation it will require to be shown that it can save a larger proportion of what experience tells us are usually unfavourable cases than the old operation." Spath had claimed that it would exert a curative effect on osteomalacia and, while admitting the possibility of this, Harris pointed out that such a disease did not exist in his country so that one supposed benefit of the operation would be of no value there. He concluded "as far as we are concerned there will seldom be any occasion to perform this unsexing method here. We have no malacosteon to cure by it; have had but four cases out of 111 in hospital and seldom have a dangerous haemorrhage or inertia in any early case." Godson, however, was of a very different opinion. At the end of his paper, he said "I hope that the time is not far distant when Porro's operation may become one of election displacing to a great extent, craniotomy. I see no reason why its results, when performed under favourable circumstances, should not compare well with those of hysterectomy for the removal of large uterine fibroids; and see what splendid results we have now arrived at with these operations!."

As time went on, however, the results improved and during the years 1885 to 1889 inclusive, there were in all countries, 158 operations with 47 deaths, a mortality of 29 per cent (Harris 1891). Considering the results of different countries, we find in Milan

up to the middle of 1891, 31 operations from which 22 women recovered and 29 children were delivered alive. The record of the great lying-in hospital of Vienna, the Allgeme<sup>e</sup>ine Krankenhaus, was very remarkable. From 1877 to 1885, there were 27 Porro operations with a maternal mortality of 52 per cent. During the next three years, 1886 - 1887 and 1888, there was a remarkable change, and out of 25 Caesarean and Porro-Caesarean operations, only two mothers and nine children were lost. Twenty of these operations took place in 1888. In Germany, up to 1885, the maternal mortality from 29 Porro operations was 65.5 per cent. and 38 per cent. of the children were also lost. From 1885 to 1889, there were 20 operations with but two maternal deaths and the loss of 5 children. Italy, up to this period, had the greatest number of Porro operations to her credit but made slow progress, when compared with other countries, in improving the rate of maternal mortality. Thus up to 1885, 38 women and 12 children were lost in 65 operations, whilst during the following five years, a similar number of operations were performed with the loss of 24 mothers and eight children, a reduction in maternal mortality from 58 per cent. to 36 per cent. Harris (1891) advanced a number of reasons for the improvement in the results of the Porro operation which was much more popular in the continent of Europe than in Britain or America. Briefly, these were:-

- (1) Making the operation one of election and not a last resort.
- (2) Operating early in labour.
- (3) Rigid antisepsis.
- (4) Abandonment of such experiments as returning the uterine stump into the abdominal cavity.
- (5) Controlling haemorrhage manually or by elastic tubing.
- (6) Turning the uterus out of the abdomen before incising it in doubtful cases, e.g., where the foetus was dead or sepsis present.
- (7) Washing all blood out of the abdominal cavity.
- (8) "Collaring the stump" - Sewing the cervical and abdominal peritoneum together.
- (9) Antiseptic treatment of the stump.
- (10) Abdominal drainage where required instead of abdomino - vaginal drainage.

We must now retrace our steps and consider the numerous modifications suggested by different operators, some simple and beneficial, others vital and a few for the worse.

In the first eight Porro operations performed the uterus was incised in situ but in 1878, Prof. Muller of Berne, Switzerland suggested bringing the uterus out of the abdominal cavity before making the incision therein, and constricting its base with an elastic tube such as used during amputations. On February 4th, 1878, he operated on a multipara of 37 years suffering from



malacosteon and who had been in labour  $3\frac{1}{2}$  days. The foetus was already dead and the mother's pulse rate 136. In spite of her unfavourable condition, the abdomen was opened by a long incision and the uterus turned out before being incised. The peritoneal cavity being protected against admission of fluid, the uterus was first constricted, then opened and evacuated, after which the steps of the operation followed the usual plan. The object in removing the uterus from the abdomen before evacuating its contents was to control the haemorrhage more early and lessen the risk of its putrid contents escaping into the peritoneal cavity. The effect of removing these septic matters was shown by a fall in the pulse rate to 96 shortly after the operation and to 84 the next day while the temperature fell from 102 F. to 97 F. The patient ultimately recovered after a stormy convalescence. The great drawback to this method was the necessarily large abdominal incision. In some cases it was found necessary to evacuate the liquor amnii before the uterus could be turned out of the abdomen. There was also a risk of asphyxia of the child owing to the use of the elastic tourniquet. Thus in Richardson's first successful case in America, it was reported that "at birth the child was in a condition of suspended animation, so that considerable effort had to be made at resuscitation but soon, through the intelligent care of Dr. Broomall, it began to breathe regularly and has since been in vigorous health. This

condition of asphyxia of the child is usual in a Muller operation. Simpson (1881) thought that only if the child was dead and the uterus contained noxious material, was such a step justified, although Veit (1880) suggested that the size of the uterus might be lessened, and thus brought out through a smaller abdominal incision, by rupturing the membranes through the vagina prior to operation. Muller's plan was, however, adopted as an improvement on the original method of Porro and the next to act on it was Prof. Chiara, of the Santa Caterina Hospital of Milan, on May 23rd, 1878. The patient was lost, however, although she appeared to have a good prognosis. This result caused the staff of the hospital to adhere to the original method with remarkable success - 11 out of the next 12 cases operated on there recovering. Good results, however, followed the Muller method in other hands and it ranked high, especially where the placenta was attached to the anterior wall of the uterus and the foetus was dead. Occasionally, children were lost owing to asphyxia. Out of the first 42 Porro-Muller operations, as they were called, up to March 1885, 21 women and 31 children were saved.

The usual method of opening the uterus was by means of a longitudinal incision but Godson suggested making a small incision at the junction of the lower and middle thirds of the uterus and then tearing the organ transversely. "Here" he said "the incision is more likely to gape readily, to be out of the way of the placenta and to be within immediate access to the

neck of the child. Then the tearing is effected very rapidly and with less likelihood of bleeding than by cutting."

The management of the pedicle appeared to be a big factor in deciding the success or otherwise of the operation. Some of the operators returned the pedicle into the abdomen after removal of the uterus but disaster generally followed this step. Taylor of New York tried this method, as did Veit of Bonn, both in 1880, but both patients died. In Godson's collection of cases, 11 out of 14 treated by this method were lost, 8 of them from peritonitis. Such unsatisfactory results led to the abandonment of "such experiments", as Harris (1891) called them.

The methods employed to secure the pedicle outside the abdomen were numerous. Porro used ~~the~~ Cintrat's constrictor leaving the whole apparatus under the dressing. This method was popular in Italy although some surgeons only used it to tighten up the wire ligature, removing it immediately afterwards. Cintrat's constrictor was apt to come loose under strain, for example as a result of post-operative vomiting, and to obviate this, Hegar of Freiberg, in 1877, suggested passing long metal pins through the pedicle so that the ends lay on the abdominal walls immediately above the wire loop. Instead of the wire loop, Spath of Vienna suggested the use of a chain ecraseur. The objection to this instrument was that the chain was apt to cut through the pedicle and

cause haemorrhage. Other methods used to secure the pedicle were by ligaturing it with metal or silk and stitching it to the lower angle of the abdominal wound. Koeberle's serre-noeud was recommended by Godson; it was a handy instrument, easy to apply and small enough not to inconvenience the patient.

In many of the early cases, drainage was employed by means of tubes passed through the pouch of Douglas into the vagina and also into the abdominal wound. In Italy in particular, this method was very popular but Godson considered it unnecessary, at all events with strict Listerian precautions.

Oppenheimer of Wurzburg, Germany, used manual compression as a substitute for the Esmarch apparatus, to control haemorrhage. The date of his operation by this method was July 4th, 1880. After emptying the uterus he secured the pedicle by means of a Spencer-Wells clamp. Both mother and child were saved.

In 1890, Lawson Tait of Birmingham suggested a modification of the Porro operation which proved very successful and came to be known as the Tait-Porro operation. An incision, 4 inches long was made as for abdominal section. A loop of drainage tube was carried over the uterus and down into the pelvic sulcus, tightened sufficiently to strangle the circulation and then tied. A small incision was then made in the uterus, just large enough to admit one finger. By gentle rending with the finger, an

aperture was made sufficiently large and the child removed foot first. After removal of the placenta, the now contracted uterus was pulled out of the wound and the elastic ligature retightened. Needles were then passed through this flattened tube, through the uterus and out at the other side so as to form two parallel bars to support the weight of the uterus and stump and keep it outside the wound. Following complete toilet of the peritoneum, stitches were then passed in the ordinary way so as to close the abdominal wound accurately round the stump. The uterus was then cut away close to the needles and strangulating rubber tube, but leaving a little tissue above. The stump was dressed with perchloride of iron and covered with a dry dressing. Tait called this procedure "about the easiest and simplest operation in surgery." He declared that the mortality from such an operation should not exceed five or six per cent. whereas the mortality from the ordinary Caesarean section was from ninety to ninetyfive per cent., a totally inaccurate statement from one who freely admitted that he practised obstetrics but little.

In America, Wagner, in 1904, suggested a modification of the prevailing technique. After raising up the uterus, he grasped the elongated cervix with the left hand compressing it tightly. Four pairs of forceps were put on the tissue of the uterus, one anteriorly, one posteriorly and one on each side.

These served as a landmark for subsequent incisions and as levers to raise and control the stump. The uterus, with the child still inside, was then amputated with scissors. Although success attended Wagner's efforts, the method was not generally adopted.

The advantages claimed for the Porro operation over the "old" Caesarean operation were:-

- (1) The uterus being removed and the stump of it being outside, there was no danger of bleeding within the peritoneal cavity or of exudation of the lochia, as before, through the incised uterine wall. At the time of operation, the risk of haemorrhage was much less for as soon as the cervix was constricted, it ceased.
- (2) Should bleeding from the pedicle occur, it could easily be controlled from outside, this advantage was lost when the pedicle was returned to the abdominal cavity.
- (3) The patient was, of course, sterile after the operation. Some writers considered this advantageous, others the reverse, but as Playfair (1886) declared, "in the class of women requiring the Caesarean section from pelvic deformity, it is questionable whether this can fairly be considered as a drawback. Many of the women requiring this operation were drawn from the poorest

of the poor, ill-nourished and suffering from various constitutional diseases. Doubtless, their sterilization was a benefit to the community.

Porro's operation was received at first with great enthusiasm, particularly in Germany, but it was not long before voices were raised against it, especially in 1881 and 1882. Schroeder declared he could not look on Porro's operation as the operation of the future, saying he regarded it only as a transitory method which must be replaced by some modification of the "old" Caesarean section admitting of a safer prognosis, while Hecker (1882) declared that it caused a mutilation which could only be indicated when no other means could answer the purpose. Frank (1887) was of the opinion that the operation was a retrograde step, while Cohnstein (1881) protested against the mutilation of the mother. Sanger limited its domain to the following cases:-

- (1) Where natural drainage was difficult or impossible, for example stenosis or artresia of the vagina or where that passage was obstructed by pressure of a tumour from without.
- (2) Pregnancy in the occluded horn of a bicornuate uterus.
- (3) Infected cases.
- (4) After previous Caesarean section.
- (5) Possibly in severe general osteomalacia.



With more vehemence but from a narrow-minded and silly point of view, Porro's operation was denounced by Schlemmer(1883). This writer held that marital intercourse with a woman on whom this operation had been performed was forbidden by the tenets of the Christian and Jewish religions, and that the surgeon who performed it in Germany, in cases where recourse might have been had to the "old" operation, was liable to imprisonment for five years with hard labour for transgressing the law about depriving an individual of his or her capacity of procreation. Schlemmer admitted but two indications for the operation as performed by Porro:-

- (1) A degeneration of the soft tissues which would soon lead to death, and
- (2) Atresia of the vagina or occlusion of that passage by a growth which prevented escape of the lochia.

Needless to add, only a small percentage of all Porro operations fell, at that time, within this limit.

P. Muller, of Berne, on the other hand, wrote strongly in defence of the Porro operation and declared that it was not yet proved that any kind of uterine suture yielded as good results as amputation of the uterus, which was done, he said, not to sterilise the woman, but to remove the risk of escape of uterine discharge into the peritoneal cavity. He also declared that neither a subtle technique nor special instruments were needed, adding that a pocket case,

an Esmarch tube and two long needles were all that was required. Most other writers, however, did not subscribe to this view, considering the "old" operation a much simpler procedure.

The Porro operation, however, gradually became ousted from popular favour by the new "conservative" method devised by Sanger, at any rate in the majority of cases "of election". It also became expanded to include all operations which terminated in supravaginal amputation of the uterus, whether the cervical stump was treated outside the abdominal cavity, as in the original method of Porro, or returned to the abdomen.

In the latter case, after cutting away the uterus, the cervical canal was carefully sponged out, touched with iodine or perchloride of iron, the anterior and posterior lips sutured and the whole closed in by uniting the anterior and posterior layers of the broad ligament and the vesical peritoneum and attaching the same to the cervical stump by continuous or interrupted sutures.

Nevertheless there still remained a field for the Porro operation. Reed, of Chicago, in 1900, gave the following indications:-

- (1) All cases where, owing to the general conditions, Caesarean section is indicated and removal of the uterus required.
- (2) When the child is dead, and infection of the uterus has taken place.
- (3) Extensive atresia of the vagina, preventing

discharge of the lochia.

- (4) Cancer of the cervix (total hysterectomy advised).
- (5) Atonia uteri or uncontrollable haemorrhage from the placental site.
- (6) Cases of ruptured uterus where suturing would be unsafe.

Hirst of Philadelphia, in 1916, did not consider a Porro operation "with dropped stump" a desirable operation where infection was suspected, reserving it for "clean cases complicated by fibroid tumour or other complication making removal of the uterus desirable." He suggested that, for cases undoubtedly infected before operation, but in whom craniotomy was not advisable on account of present conditions, and in cases of ruptured uterus, the Porro operation with marsupilization and extraperitoneal fixation of the stump, accompanied by cervical drainage, was preferable.

In Great Britain, Galabin, in 1902, expressed similar views to these American writers, reserving the operation for infected cases and those in which the uterus could not be made to contract after removal of its contents. He also considered it an easy and rapidly performed operation.

In more recent times, (1931), Phaneuf gave the indications as infected cases where vaginal delivery was impossible, obstructive fibroids, uncontrollable ante- or postpartum haemorrhage, ruptured uterus, placenta accreta, cancer of the cervix and osteomalacia.

To these Lash and Cummings (1935) added pulmonary tuberculosis and chronic nephritis. They believed tuberculosis was aggravated during menstruation and during the puerperium and argued that "the function of the operation in tuberculous women is not only to sterilise when the condition warrants, it, but also to eliminate the involution phenomena and future menstruation". In their series of 53 cases, 5 patients underwent the operation for this reason.

In chronic nephritis, they justified their procedure by declaring that, during involution, there is an increase in nitrogenous end-products in the circulation due to breaking down of the uterine musculature by autolytic processes. By removing the uterus, they felt that the load on the kidneys would be decreased. Seven of their cases suffered from chronic nephritis, one of whom also had a placenta praevia, one a fibroid uterus, and the remaining five a condition of pre-eclampsia superimposed on a chronic nephritis. It is more than doubtful if the majority of obstetricians would agree with these indications, certainly in this country.

The Porro operation, in its original form, is rarely performed today, but was, at the time of its inception, a distinct advance, the only serious drawback being the mutilation of the patient. It is scarcely correct to describe a Caesarean section, followed by removal of the uterus, as a Porro operation, as is not infrequently done.

Only six years elapsed between the introduction of

the Porro operation and the evolution of a formidable rival - the Sanger operation - the story of which must form part of the next chapter.

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CHAPTER V.Development of the operative technique of  
the "classical" operation.(1) Pre-operative Technique.

In view of the fact that the majority of Caesarean sections in the old days were what might be termed emergencies, there was but little time for pre-operative treatment.

Lauverjat in his treatise, however, made several suggestions to be carried out during the last month of pregnancy, should it be anticipated that Caesarean section might become necessary. He advised venesection to be performed from time to time in moderation and the frequent administration of purgatives and antiphlogistic drinks. For two weeks before the expected day of labour, he recommended the patient to have a daily warm bath, remaining in it for about two hours. Lauverjat also advised softening of the breasts by warmth and suction.

He stressed the necessity, in cases of emergency, of reducing the inflammation so often present as a result of frequent examinations and attempts at delivery. For this purpose, he recommended venesection and a warm bath.

All writers from Rousset onwards mentioned the necessity of emptying the bladder, by catheter if

necessary, and rectum, usually by an enema.

Prior to the introduction of anaesthetics, measures were usually required to restrain the patient and hold her steady during the operation. For this purpose, her feet and legs were usually tied together, and along with her arms, held in the grip of strong assistants. Almost all the old pictures of the operation show this being done.

Scipio Mercurio advised that, if the patient be strong enough, the operation should be performed with the patient sitting on the edge of the bed, one assistant on each side to hold the arms and shoulders and a third placed between the knees to steady the legs. If, however, the patient was weakly she was allowed to recline on the bed, supported by cushions. This was the position favoured by the majority of the early operators.

Lauverjat also stressed the necessity of ascertaining that the child was alive before deciding to operate. H. F. Killian of Bonn, in 1834, suggested that to decide this point the membranes should be ruptured and a hand passed into the uterus to feel for pulsations in the umbilical cord. Fortunately, such a dangerous suggestion was not adopted.

There is little else worthy of note in the pre-operative technique until the introduction of antiseptics by Lord Lister during the years 1867 to

1893. Shaving of the external genitals and thorough antiseptic preparation of the skin of the abdominal wall then became the order of the day, together with careful preparation of all instruments and dressings to be used.

Douching of the vagina in all cases, whether believed to be infected or not, was popular for a time. Thus Champneys, in his account of the first successful Sanger operation, or conservative Caesarean section as it is probably more correctly termed, (1889) related that, prior to operation, the vagina was washed out with two quarts of a 1-2000 solution of corrosive sublimate and the cervix and vagina scrubbed with a swab of cotton wool soaked in a similar solution. The abdominal wall was well washed with soap and water and covered with a pad soaked in a solution of sublimate, 1-1000. While the preparation of the abdominal wall became more thorough, several days being spent in the process if possible, the douching and scrubbing of the genital passages gradually disappeared from favour except in infected cases.

The advantage of having the patient in hospital for some days before operation also became recognised as it became increasingly an elective procedure rather than an emergency. Many of the patients suffered from rickets, often accompanied by bronchitis and suitable treatment in these cases lessened the operative risks.

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(2) The Abdominal Incision.

There is practically no part of the abdominal wall where the external incision has not, at one time or another, been made. By the early operators the abdominal incision was made at the side, sometimes as in the earliest cases, on the left side to avoid the liver, sometimes on the right to avoid the spleen. If a ventral hernia was present, the incision was made on that side.

Rousset, Mercurio, and Ruleau advised that the site of the proposed incision be first marked on the skin with ink, between the navel and the flank, somewhat obliquely, "three fingers breadths from the groin, somewhat towards the mons pubis, skirting the rectus muscle" which must be avoided. Mercurio also recommended making 4 or 5 small lines running cross-wise to mark the sites for the sutures for the abdominal wall.

Levret remarked that this description of the abdominal incision was somewhat vague, he advising an incision in a vertical direction from the anterior superior iliac spine to the tenth costo-chondrol<sup>al</sup> junction. The danger of injury to either liver or spleen being almost negligible, surgeons came to make the incision on the side to which the uterus was rotated. The incision on the flank was fraught with danger to the epigastric artery and also had the

disadvantage that it was necessary to cut through three muscles.

The next site selected for the abdominal incision was the linea alba and during the second half of the eighteenth century much discussion ensued as to who first suggested and performed it. Lauverjat and later, Velpeau, gave the credit to Mauriceau but in view of the fact that he (Mauriceau) strongly condemned the performance of operation on living women, it is difficult to see how this can be substantiated although he did advise this incision on post-mortem Caesarean section.

Solayres, in his "Lectures on Midwifery" (1765) stated that the inconveniences attached to the lateral and oblique incision of the abdomen would one day engage practitioners to make it in the linea alba. "In the meantime" he added, "I advise you to perform it on that part; the incision is easier and less painful because there are fewer parts to cut; the uterus presents itself to hand, it is divided in its middle part and in a direction parallel to its principal fibres."

Solayres did not claim to be the first to suggest the idea - giving his sources of information as the "Institutes of Surgery" by Platner, and a pamphlet by S. G. Guenin, a surgeon of Crepy in Valois, entitled "Histoire de deux operations caesariennes faites avec success en 1746 et 1749" and published in

Paris in 1750.

The descriptions of the incision as given by Guenin and Platner were variously interpreted and F. A. Deleurye in his publication "Observation sur l'operation Caesareinne a ligne blanche" 1779, gave it as his opinion that their incisions were not made in the linea alba.

Platner said "Incidenter juxta lineam albam, plaqa majori quae ad umbilico ad ossa pubis" etc. - "near the white line." He also advised that the abdominal muscles should be cut through and that the epigastric artery must be avoided. As Lauverjat pointed out, such a description suggests an incision in the lateral part of the abdomen rather than through the linea alba.

Guenin described his incision as follows:-

"I cut the integument about the length of six inches in a straight line beginning an inch below the umbilicus and continuing to within an inch of the pubis."

He then went on to describe how he "cut through the cellular membrane, the muscles and the peritoneum to discover the uterus." Various other surgeons at

Cresy saw Guenin's patient and reported as follows:-

"We find the sixth day after the operation, a wound in the belly four or five inches long, the lower part of which was about an inch from the groin, rising in a straight line nearly in the middle, to the navel, two or three inches distant from the linea alba."



Lauverjat did not, on anatomical grounds, believe that Guenin's claim could be upheld, but Baudelocque remarked that if Deleurie meant by the linea alba, only a line without breadth, then his opinion was correct. He pointed out, however, that by the linea alba was meant the aponeurotic space which separates the recti muscles below the umbilicus, which space in the latter periods of pregnancy often has considerable breadth, and that it was through this space that Guenin made his incision.

Deleurie himself had claimed the honour of first suggesting the incision through the linea alba along with his colleague, Warroquier of Lille, although in his book published in 1770, he mentions making the incision at the side of the abdomen. According to Baudelocque, the incision in the linea alba was practiced in Berlin in 1772 (Mansfield says 1769) by Henckel and was also mentioned in a Latin dissertation published in Vienna in 1776 by Caroli Franc and entitled "*Bohemo pragensis dissertatio inauguralis medico chirurgico - obstetricia de hysterotomia.*"

Lauverjat himself recommended quite a contrary direction for the abdominal incision. As we shall presently see, he favoured a transverse incision in the uterus and proposed therefore that the abdominal incision should be made between the recti muscles and the spine just below the third false rib according as the fundus was more or less distant from it.

He believed that the wound made in this manner would heal better than if it were made vertically. Lauverjat claimed several successes by his method.

In the 73 cases mentioned in Baudelocque's first memoir, the abdominal incisions were made as follows:-

35 on the side of the abdomen from which 18 women recovered.

30 on the linea alba, from which 10 women recovered.

8 by Lauverjat's method from which 3 women recovered.

From such statistics, the incision through the linea alba would appear to be the least satisfactory.

In 1803, still another direction for the abdominal incision was suggested, this time by a German surgeon, G. W. Stein, in his textbook published in that year. He believed the vertical incision likely to produce separation of the lips of the uterine wound and the transverse likely to cause over lapping of the edges. He proposed, therefore, that the abdominal incision should be commenced at the anterior end of the last rib and carried obliquely across the abdomen towards the ramus of the pubis on the opposite side so that the middle of the incision should cross the linea alba at its midpoint.

In the early part of the nineteenth century, many continental accoucheurs were of the opinion that none of the proposed methods of incision were applicable in every case owing to different circumstances attending

each, such as the structure of the integuments of the abdomen, the situation, form and projection of the uterus. The advantages of the incision through the linea alba were the slight haemorrhage, thinness of the parts to be cut and the good healing which followed as a rule. The disadvantage was fear of injury to the bladder. In operating at the side surgeons were afraid of injury to the epigastric artery. The general rule was to make the incision where the projection of the uterus was greatest. It was claimed that by so doing, there was much less fear of projection of the omentum and intestines as the integuments were close to the gravid uterus at that point. In Britain, however, most surgeons preferred to make the abdominal incision through the linea alba, although the transverse incision was occasionally used (twice in Radford's series described in 1865) and favoured by Burns of Glasgow (1824).

Blundell, who made numerous suggestions regarding Caesarean section, discussed the question of what later came to be called the "high longitudinal incision." In the 1842 edition of his text book, he wrote "Some might think perhaps that in removing the foetus by the Caesarean incision, we ought to make the opening above the navel instead of below. To this opinion I can by no means accede for if we made the incision above the navel, the

intestines will protrude more copiously, the region of the placenta will most probably be divided, and on abstraction of the ovum, the womb collapsing into the pelvis, will sink below our reach disappearing beneath the intestines which fall over it. Place the incision, therefore, below the navel, by this, you will avoid these impediments."

The "high longitudinal incision" was revived by A. B. Davis of New York in 1904 with the object of preventing adhesions between the uterine wound and the abdominal wall with consequent fixation and distortion of the uterus. In this procedure the abdominal incision was made directly above the umbilicus. After closure of the uterine wound, the uterus sank below the umbilicus so that the uterine and abdominal incisions were never in contact. Adhesions of the intestine and omentum to the uterine scar were not avoided by this method and there was the further danger of blood and liquor amnii trickling down into the pelvis where it could not easily be reached, the toilet of the peritoneum thus being difficult. Phaneuf stated that he had seen more intestinal distension and paralytic ileus follow this method of technique than any other. While Davis obtained good results from his technique it was not generally popular.

The incision now in use is the vertical mid line, partly above and partly below the umbilicus, different

writers giving different proportions.

Baudelocque, J. L.	(1798)	Memoirs on Caesarean section. English Trans. J. Hull, Manchester.
Blundell, J.	(1842)	Principles & Practice of Obstet- ricy. London.
Burns, J.	(1824)	The Principles of Midwifery, 6 Edit. London.
Davis, A. B.	(1910)	Trans. Amer. Asso. Obstet. & Gyn. <u>23</u> , 320.
Lauverjat, M.	(1788)	Traite de l'operation Caesarienne, Paris.
Mansfield, D.	(1826)	Edin. Med. Journ. <u>25</u> , 227.
Mauriceau, F.	(1672)	The Diseases of Women with child and in Childbed. Eng. Trans. H. Chamberlen. London.
Mercurio, S.	(1604)	La Commare Riccogli- trice.
Radford, T.	(1865)	Caesarean section. Manchester.
Rousset, F.	(1581)	Traite nouveau de l'hysterotomie ou Enfantement Caesarean etc. Paris.
Ruleau, M.	(1704)	Traite de l'Operation Cesarienne, Paris.
Velpeau, A.A.L.M.	(1831)	Elementary Treatise in Midwifery, English Translation, by C. D. Meigs. Philadel- phia.

(3) The Uterine Incision, Extraction of Uterine  
Contents etc.

The incision to be made in the uterus has been ever more varied in position and the subject of greater discussion than its counterpart in the abdomen.

By the majority of the earliest surgeons, the incision was made in a longitudinal direction usually from top to bottom. Levret (1770) showed the necessity of making this incision sufficiently large, as otherwise difficulty might be experienced in extracting the child especially if the membranes had already ruptured as was usually the case.

Mercurio advised an oblique uterine incision commencing "in the upper part and make it run crosswise" in order to avoid the risk of injuring the external genitals of the foetus.

Lauverjat (1788) , however, who recommended the transverse abdominal incision, also advised a transverse incision of the uterus. It was to be made, he declared, as near the fundus as possible, the precise site of the incision to be determined not by the surgeon, but by the position of the womb. If rotated to the right, then the incision was to be made on that side and vica versa. If the fundus was unusually high, then must the incision be likewise. Lauverjat thought his method possessed two great advantages. Firstly, and most important, as the lower two thirds of the uterus remained uninjured, a



cavity might easily form in which the effused blood would be received without passing into the cavity of the abdomen. Secondly, he believed that the wound in the uterus would heal better since contractions of the organ took place mainly from above downwards. While the method was attended with success in the hand of its inventor, the majority of surgeons did not approve of it. Baudelocque considered the danger of injury to the large blood vessel of the uterus to be very great.

Millot, who was an advocate of the lateral abdominal incision, recommended in 1795 that the uterus be divided as much as possible to the side, about three to four inches from the fundus, with the object of avoiding the possibility of adhesions forming between the intestine and the uterus. Like the transverse incision of Lauverjat, the danger lay in the cutting of large blood vessels and there was the added risk of wounding the broad ligaments and the Fallopian tubes. Millot's suggestion did not receive a favourable reception and was soon abandoned.

A diagonal uterine incision was suggested by Kilian of Bonn (1875). He thought that the uterine wound would be less liable to gape as the contracted tissue would be divided through planes where the fibres varied in direction.

The principal object of the inventors of the various incisions was prevention of gaping of the

uterine wound, suturing of the wound being but rarely done at this time.

The incision so far had been made in the front or sides of the uterus. Even the posterior wall was not due to escape and the incision in this part of the organ was first recommended by Cohnstein (1881). He advised turning out the whole uterus and making a longitudinal incision through the posterior wall. After removal of the foetus and secundines, a drainage tube was passed through the pouch of Douglas into the vagina. Cohnheim's idea was that the great thickness of the posterior wall of the uterus would ensure better closure of the uterine wound: that the weight of the uterus with the intestine pressing on it would also aid in avoiding gaping of the wound: and lastly that the dependent position of the wound would ensure proper drainage through the tube in the event of any escape of fluid from the uterine cavity into the abdominal cavity.

The objections to this method were that:-

- (1) It was not always possible to bring out the whole of the uterus from the abdomen. If not impracticable, it might at least be unwise.
- (2) If the placenta was encountered great difficulties might arise, at least greater than those resulting with an anterior incision.
- (3) The wound of the uterus, if it leaked, as was highly probable, would do so into the peritoneal cavity.

The year after Cohnheim's suggestion the new Sanger operation appeared and not unnaturally little more was heard of it although the incision was revived in 1897 by Johannowsky in performing Caesarean section for the second time upon the same patient. He believed it might be useful when operation was necessitated by large abdominal tumours.

In 1882, F. A. Kehrer of Heidelberg, suggested a low transverse incision. He drew attention to the necessity of devising means whereby the uterine wound might be safely closed thus avoiding haemorrhage and protecting the pelvic cavity against infection. He thought this highly desirable object might be arrived at by:-

- (1) Selecting a site for the incision where gaping was least likely to happen.
- (2) Prevention of infection at the time of operation and afterwards establishing free drainage both of the uterine cavity and abdominal wound.

With regard to (1) he advised the incision to be made at the level of the internal os. The uterus having a natural tendency to anteflex, this plan, he believed, would offer the least opposition to union by sutures. Other advantages were that the placenta was seldom encountered, the abdominal incision would be smaller and that the head being in most cases the first part to protrude, the child's chances would be improved.

The objections to it were that there might be difficulty in extracting the child and that large blood vessels entering the lower part of the uterus might be cut. This last, however, Kehrer considered could be controlled by ligature. The danger of the lochia entering the pelvic cavity and giving rise to adhesions and parametritis could be avoided by strict asepsis.

While Kehrer's suggestion did not arouse much interest at the time, it was without doubt an outstanding landmark in the history of the intraperitoneal lower segment operation - to be considered in a later chapter.

Kehrer's recommendations regarding stitching of the uterine wound and drainage will be considered later when these subjects are discussed.

While Kehrer is rightly given credit for being the first to perform the operation by means of a low transverse uterine incision, he was not, as will presently be shown, the first to suggest it.

In 1897, still another method of incising the uterus was suggested, this time through the fundus. From observations made at a postmortem examination on a full time pregnant woman, H. Fritsch of Bonn was struck by the ease with which the pathologist extracted the child through a transverse fundal incision. Fritsch resolved <sup>it</sup> to adopt in his next case of Caesarean section believing it had the following advantages.

- (1) The abdominal incision is made higher than usual so that the umbilicus corresponds to the middle of the incision.  
(Fritsch believed this would reduce the risk of subsequent hernia which frequently occurred when the incision was prolonged downwards).
- (2) The uterus being pulled well forwards, the transverse fundal incision prevented completely the escape of blood and liquor amnii into the peritoneal cavity.
- (3) The haemorrhage was less.
- (4) As the lower extremities of the child, in the majority of cases, presented at the fundus, extraction of the child was rendered more easy.
- (5) The extreme diminution of the wound after uterine retraction made it necessary only to insert a few deep sutures and also allowed satisfactory insertion of sero-serous sutures.

Fritsch further pointed out that as the fundal incision was made parallel to the course of the principal blood vessels, the risk of haemorrhage was greatly reduced as it was by the fact that sutures were inserted at right angles to those vessels. With the ordinary longitudinal incision on the other hand a divided sinus might lie between two sutures.

Fritsch's proposition excited great interest, particularly in Germany. Such a proposal coming from so eminent an authority caused it to be adopted in various continental clinics. Important Obstetrical Journals such as the *Centralblatt für Gynakologie* and the *Archives für Gynakologie*, were flooded with reports of cases in which it had been employed, no fewer than sixty-two being reported in less than three years.

The fundal incision had, however, been employed before, but not transversely, by Caruso (1898) and Müller (1898). The former reported four cases where the foetus was extracted through a sagittal fundal incision, commencing as a button-hole opening in the centre of the fundus and extending for an equal distance on the anterior and posterior wall. Two of his cases died from causes unconnected with uterine incision.

Caruso claimed priority over Fritsch in suggesting a fundal incision but Müller of Berne had recommended and employed a sagittal fundal incision since 1894. His object was to avoid the lower uterine segment which was not infrequently injured in extracting the child through the ordinary longitudinal incision. Müller also claimed a firmer cicatrix by this method and believed that there was less risk of rupture of the uterine scar.

Braun (1898) of Vienna was the first to adopt

Fritsch's method but apparently he was not greatly impressed. In his first case considerable bleeding was encountered, although as he admitted this may have been due, in part at least, to defective uterine contractions. He did not find extraction of the child to be easy.

A number of objections were however advanced against the transverse fundal incision.

Braun - Fernwald (1899) did not think the resulting scar would be firm as owing to the thinness of the wall at the fundus, the stitches might cut through. Ludwig (1899), however, who performed the operation twice on the same patient by means of the transverse fundal incision, found the scar at the second operation sound and strong.

One danger from this incision was that adhesions of the uterus to the bowel and high attachment of the fundus to the abdominal wall might result, involution of the uterus thus being interfered with and that discomfort from dragging upon the abdominal wound might follow.

Schroeder (1898), however, from an experience of four cases, did not have any fear of adhesions between the uterus and bowel as in his view the uterus became anteverted after delivery and the fundus directed towards the abdominal wall.

Another drawback was that difficulty might be experienced in removing the placenta and membranes



while not all operators were convinced that the placenta was less frequently encountered or that bleeding was so much lessened.

In Great Britain, W. J. Sinclair (1901), reported unfavourably on the transverse fundal incision. Munro Kerr reported in 1902 having tried it on three cases and considered that Fritsch had at least directed the attention of all operators to the importance of making the incision as high as possible. This alone was a great advance as the lower uterine segment was frequently damaged by extracting the child through a longitudinal incision made too low.

The reception of Fritsch's incision in America and France was also lukewarm.

In 1921, Arnold Jones proposed a new gridion incision for opening the uterus based on the fact there are three layers of muscle in the uterine wall, the outer and middle layers being easily differentiated in the full time gravid uterus.

First the external layer of uterine muscle was to be incised transversely, the incision being in the anterior wall just below the centre of the body. To commence the incision, Jones made a small V exactly in the middle line and about  $\frac{1}{8}$ th of an inch into the muscle; this he declared, facilitated accurate position in the later stitching. Blunt-pointed straight scissors were inserted into

this opening and passed transversely under the superficial layers of the muscle, <sup>just</sup> to one side and then to the other. The superficial layer was then incised along this tract, carrying the incision the full distance across the front of the uterus, and then pulled from the middle muscular layer upwards towards the fundus.

The middle and inner layers of muscle were then incised longitudinally, the line of incision being selected which appeared most clear of blood vessels.

After removal of the uterine contents, the incisions were closed individually with a continuous catgut suture, the resulting scar being like an inverted T.

By this method Jones, from experience of eight cases, believed that the bleeding was distinctly less than with the ordinary incision and also that there was much less risk of rupture of the uterine scar, a danger to which obstetricians at that time were giving much thought.

After trials of incision in all directions, surgeons still prefer the anterior longitudinal incision.

In pre-anaesthetic days, speed was the great factor in operation and not infrequently some surgeons cut through the abdominal and uterine wall at one sweep. Such spectacular work sometimes

resulted in serious accidents such as injury to the child and the cutting of a loop of bowel which may have found its way between the abdominal wall and the uterus. Such a danger was well recognised by such writers as Levret. The majority proceeded with more care and deliberation, first making the abdominal incision down to, but not through, the peritoneum. Baudelocque, in incising the uterus, advised making a small incision at first and then using a finger of the left hand as a guide to its prolongation. Simpson suggested a small uterine incision at first to be enlarged by tearing with the fingers, for which he was strongly criticised by Campbell.

Early surgeons, including Rousset and Ruleau, made their incisions with a razor, the blade being fixed to the handle with a bandage. Two were usually at hand, one for the abdominal incision and a second for that in the uterus. Razors, however, gradually gave way to bistouries, either curved, as preferred by Levret, or straight as desired by Baudelocque.

The haemorrhage resulting from the uterine incision is often considerable, especially if the placenta is encountered in the incision and many of the early surgeons were afraid of this, it being considered one of the greatest dangers of the operation. Lauverjat, however, did not seem to be

afraid of it - in fact he rather encouraged it. He recommended that as soon as the placenta was seen, it should be partially separated and the wound covered with a moderately hot glass funnel and a quantity of blood, sufficient to reduce the uterine vessels be allowed to flow out. Most surgeons advised that the placenta be avoided if possible. Lauverjat considered that a controlled flow of blood was to the patient's advantage and reduced the risk of subsequent inflammation.

To control the haemorrhage from the uterine incision, Murdoch Cameron of Glasgow recommended in 1892, the placing on the anterior surface of the uterus of an oval vulcanite ring and making the incision within its circumference. By means of sustained pressure the haemorrhage was reduced. The popularity of this method lasted for some time and was still referred to in textbooks published in the early twenties of the present century.

The method of dealing with the child has always been extraction by a foot. Speed in extraction was also considered necessary lest the head be grasped by the contraction of the uterus.

Manual removal of the placenta was always the practice in earliest times. It was also the practice to avoid cutting through it if at all possible. Lauverjat, however, maintained that the placenta would separate spontaneously in all cases, even those

performed post-mortem. He maintained that manual removal of it increased the danger of the operation and stressed the danger of leaving part of it behind, an accident particularly liable to occur if the placenta was cut through instead of being gently pushed aside.

Stein, already mentioned as advising a diagonal abdominal incision, and after him Wigand, were the first to advise that it should be removed per vaginam. For this purpose, the latter recommended that the umbilical cord should be brought through the cervix into the vagina by means of a "small curved stick" and thus separated or allowed to come away spontaneously.

Mansfield (1826) declared this was merely a complication of the operation and remarked "the mention of it is only interesting in a historical point of view to show the different stages through which operations, as well as most other things, pass before they arrive at a state of simplicity."

The removal of the placenta per vaginam is common practice in modern times in what are usually termed "suspect" cases.

As might well be imagined, in pre-antiseptic days, sepsis frequently followed the operation, most often in the form of peritonitis. This was believed to be due to the admission of air into the abdominal cavity. Thus, Hamilton, describing the operation

in 1796, remarked "The great danger, I am persuaded arises from the admission of the air as well as from the parts divided." To avoid this as much as possible it was recommended that an assistant apply "moderate pressure" to the sides of the wound. This was, of course, also helpful in preventing prolapse of intestine, a frequent occurrence. It is noteworthy that Hamilton also advised that all haemorrhage from the abdominal wound should be arrested before the peritoneal cavity was opened.

John Aitken of Edinburgh (1785) made the rather astonishing suggestion that the operation should, in order to exclude air, be performed while the parts were immersed in tepid water. He believed this would reduce the dangers attending it but there is no evidence to show that his suggestions were ever put into practice.

Autenrieth in 1816, proposed that in order to reduce the length of time to which the intestines were exposed to the air, the stitches for the abdominal wall should be introduced prior to the making of the uterine incision.

In carrying out the toilet of the peritoneum Rousset, and his successors, including Levret, wiped all the parts with soft linen and cleaned up the blood with soft sponges. With another sponge, the uterine cavity and all the neighbouring parts were

"fomented" with an astringent lotion. Warm oil or balm was then poured in through the wound. Lauverjat, however, still stressing the danger of introducing a hand into the uterine cavity advised introducing "anodyne and relaxing injections" through the vagina into the uterus.

No special measures were recommended by the earliest operators to encourage uterine contraction but Baudelocque advised external massage and appears to have been the first to do so although various writers gave the credit to Winckel. The former also advised, if this was unsuccessful, the installation into the uterus of cold water with or without vinegar. Other measures to control the haemorrhage from the uterus, excluding the use of a ligature, considered in the section dealing with the Porro and Sanger operations, included the use of ice (Spencer Wells 1864), and the swabbing of the uterine cavity with perchloride of iron (Hicks 1870).

Rousset and Rouleau used a cannula in the form of a "pierced candle" to be placed in the neck of the uterus in order to assist drainage of the lochia into the vagina. Subsequent writers, however, disapproved of this suggestion. Levret in fact expressing doubts as to whether they did use it as the wax would be very liable to melt and the opening of course become blocked. Lauverjat considered such a suggestion very dangerous and liable to set up an inflammation in the womb.



He also drew attention to the danger of the cervical canal becoming blocked by pieces of membrane and blood clot.

To assist healing of the uterine wound, Mercurio recommended the placing in the pudendum of small tents of old linen soaked in rose oil, changed thrice daily in summer and twice daily in winter, and of herbal decoctions injected into the uterine cavity per vaginam.

To make sure that the cervical canal was patent, Hamilton (1791) advised it be opened, if necessary, by passing one or two fingers through it from the uterus.

Towards the end of the nineteenth century various operators including Garrigues (1891) and Schroeder (1898) again suggested the introduction of a drainage tube through the cervix into the vagina. Winckel (1886), (quoted by Playfair) even advised the placing of a strip of lint, soaked in oil, in the os so as to keep up a free exit for the discharge. Such procedures were roundly condemned by Murdoch Cameron (1892) who said "nothing could be worse. Of course it is the procedure of a surgeon but everyone who has practiced midwifery knows that the pressure even of a clot in the uterus may lead to serious haemorrhage. Such a body as a rule if not expelled would induce haemorrhage, distension of the uterus and bursting of the incision with speedy death of the patient. This is no mere theory but is what has actually taken place where drainage has been resorted to.

On no condition should the uterine cavity be washed out or medicated in any way. The less the parts are interfered with the better."

This last remark of Cameron's is especially worthy of notice as surgeons had previously taken great pains to wash out the cavity of the uterus with antiseptics. Thus Champneys, in his first case in 1889, described how he thoroughly sponged the inner wall of the uterus with antiseptic. Sponges soaked in a similar solution were then inserted into the uterus and removed just before the sutures were tied. A douche of 1-2000 corrosive sublimate at a temperature of 112° was also applied to the uterine cavity and it was finally dusted with iodoform. Leith Napier also reported in 1892 the swabbing out of the uterine cavity with a 1-1000 solution of perchloride of mercury.

The treatment of the uterine wound must now be considered.

Aitken, J.	(1784)	Principles of Midwifery, Edinburgh.
Autenrieth,	(1816)	Tab.Blatter <u>2</u> , quoted by Mansfield.
Braun, C.	(1898)	Central. f. Gynak. <u>22</u> , 79.
Braun Fernwald,	(1899)	Central. f. Gynak. <u>23</u> , 79.
Cameron, M.	(1892)	Brit. Med.Journ. <u>2</u> , 1383.
Ibid.	(1892)	Trans.Obstet.Soc.Lond. <u>24</u> , 121.
Caruso,	(1898)	Arch.di Ost. (Kerr Operative Obstetrics 1937)
Champneys, Sir F.	(1889)	Trans.Obstet.Soc.Lond. <u>31</u> , 142.
Cohnheim, J.	(1881)	Central. f. Gynak. <u>5</u> , 290.
Fritsch, H.	(1897)	Central, f. Gynak. <u>21</u> , 561.
Garrigues, H. J.	(1891)	Trans.Am.Soc.Gyn. <u>16</u> , 132.
Hamilton, A.	(1791)	Outlines of Midwifery, 3rd Edit. Edinburgh.
Ibid.	(1796)	Ibid, 4th Edit. Edin.
Hicks, J. B.	(1870)	Trans.Obstet.Soc.Lond. <u>11</u> , 99.
Johannowsky, V.	(1897)	Monats.f. Geb. u. Gyn. <u>6</u> , 354.
Kerr, J. M. M.	(1902)	J. Obstet. & Gyn. Brit. Empire. <u>2</u> , 21.
Ibid.	(1902)	Brit. Med. Journ., <u>2</u> , 1128.
Kilian, H.	(1875)	Proc.Med.Soc.Lond. <u>3</u> , 7.
Levret, A.	(1770)	L' Art des Accouchmens Paris.

Ludwig, H.	(1899)	Central. f. Gyn. <u>23</u> , 801.
Mansfield, D.	(1826)	Edin.Med.Journ. <u>25</u> , 277.
Müller, P.	(1898)	Central.f.Gyn. <u>22</u> , 225.
Napier, A. D. L.	(1892)	Trans.Obstet.Soc. Lond. <u>34</u> , 108.
Playfair, W.S.	(1886)	Treatise on the Science and Art of Midwifery, 6th Edit. London.
Schroeder, H.	(1898)	Monats.F. Geb.u.Gyn. <u>7</u> , 157.
Sinclair, W. J.	(1901)	Lancet, <u>1</u> , 165.
Wells, Sir S.	(1864)	Trans. Obstet.Soc. Lond. <u>5</u> , 91.

and the text books quoted in previous section.

(4.) The early efforts to suture the uterine wound.

The account of the early attempts to suture the uterine wound constitutes one of the most fascinating chapters in the history of Caesarean section. To the modern generation it may seem extraordinary that the Caesarean section had been known and practised in living women for over 250 years before anyone had the courage to insert sutures in the uterine wound, and that up to the middle of the nineteenth century, it had been done only on four occasions; but such are the facts.

The first case in which the uterus was stitched took place on August 27th, 1769. A. M. Lebas, of Moulleron, France, was the surgeon concerned, and he operated on a woman who had already been in labour for four days. A transverse incision was made in the abdominal wall from a point just below the umbilicus up to the ribs on one side. Finding this incision a little too high (!), the surgeon then made a second, more oblique than the first, which began about an inch below the umbilicus, and joined the first cut. Not surprisingly, a large amount of intestine prolapsed through these wounds. However, a transverse incision was next made in the uterus, and the child, placenta and membranes removed. Repair of the uterine wound was effected by three sutures of thread. The wound was "threatened with gangrene", but cleared up under

treatment, and the woman was able to go about her household duties by the 20th October following. This case was first reported by Lauverjat in his book "Traite de l'operation Caesarienne" published in 1788. He recommended the use of uterine sutures when haemorrhage from that organ could not otherwise be controlled, but no other surgeon for many years repeated the procedure, few approving of it, and none adopting it.

Commenting on this case, the comprehensive "Dictionnaire de Medicine", Paris 1834, stated that the uterine wound did not need any special treatment although an unskilled (!) surgeon once introduced sutures into the uterus which it was found necessary to remove.

Hull of Manchester (1799) remarked that the uterus "had been very rarely stitched." If it was thought necessary, he recommended the glover suture with the higher end left out of the abdominal wound for its removal by traction.

Repetition of the efforts of Lebas might have saved the life of at least one of the early fatal cases in Britain. In 1769, a patient, called Martha Rhodes, died 24 hours after her operation, from secondary haemorrhage, (Thompson 1771). It is not without the bounds of possibility that this might have been avoided by the use of uterine sutures. Surgeons generally were afraid to insert sutures into

the uterus, but in 1828, we find an exemplification of the old adage "fools rush in where angels fear to tread" in an operation performed in America by a charlatan on a mulatto. The operation was undertaken at the request of the patient herself. She had apparently been in a state of pregnancy close on two years, the child having been dead a long time, and the woman tired and weary. At operation the uterus was found lined with osseous matter about half an inch thick. "Two or three stitches were inserted into the uterus", which not surprisingly, showed no tendency to contract. The patient went on well until the tenth day, when she developed peritonitis, stated to be the result of dietary indiscretions, and died two days later, (Weems 1836).

There is some evidence to show however, that the uterine suture was more frequently employed about this time. Robert Estep (1837) of Stark County, Ohio, performed two successful Caesarean sections in the same patient in 1833 and 1834, and in reporting these cases he made the following remarkable observation:- "I have made no mention of sutures applied to the wound in the uterus as recommended by some authors, and I take occasion to express unqualified disapprobation of their employment. The indissoluble suture I consider dangerous, the animal ligature, to say the least, useless." Unfortunately Estep did not mention who his authorities were, but Harris (1878)



commenting on Estep's report, observed that "for a backwoods surgeon, many of whom were by no means backward in knowledge, he appears to have been much better posted up than some of our contemporaries who have tried and been forced to abandon the catgut suture within the past ten years for the simple reason that the knot will slip and open in any part of the body, where it is kept from becoming dry and hard."

In 1838, a suturing of the uterus was reported from Germany by Weigel of Hüllesenburg, but only one suture was employed by him. Nevertheless his patient recovered, (Harris 1886). He was followed in 1840 by Godfroy of Mayenne, France, who operated on March 27th, 1840, on a rickety dwarf, 42 years old, who had been in labour for 2 days. Three stitches of waxed silk were inserted, and recovery followed. For the next case, we had to return to U.S.A., where Frank E. Polin, (1880) of Springfield, Kentucky, used for the first time, silver wire to stitch the uterus in 1852. His patient, too, recovered.

It seems extraordinary that, with such a run of success attending closure of the uterine wound, it was not more generally adopted. Thus Ramsbotham (1841) remarked - "There will be no need of sutures to bring the edges of the uterine wound together." Churchill (1841), writing about the same time, was of the same opinion. In America, however, Warren Brickell (1868), who was Professor of Obstetrics in

the New Orleans School of Medicine, advocated in his lectures in 1856, the use of uterine sutures, both in Caesarean section, and in cases of rupture of the uterus, but was ridiculed for what were considered rather wild opinions. But it was not until 1867 that he put his advice into practice, when he operated on a patient who had been in labour for ten days, obstruction apparently being due to rigidity of the cervix. Attempts to deliver, first with forceps, and later by craniotomy, failed. At operation, atony of the uterus gave rise to considerable haemorrhage, which was successfully controlled by the insertion of six sutures of silver wire. The patient recovered.

That the dangers resulting from non-union, or at least only partial union, of the lips of the uterine incision were well recognised, can be seen from the remarks of C. West (1851). In a review of the mortality resulting from Caesarean section, he said, - "And this brings me to the last cause of the high mortality which follows this operation, and a cause against which skill can avail absolutely nothing, since it is inseparable from those processes which nature sets on foot after the uterus is emptied of its contents, be the period of pregnancy at which that takes place, what it may. In a large proportion of cases, the record of the examination after death states that the wound of the uterus was found gaping widely, even many days after the operation had been performed. In other instances,

it is stated that the inner edges of the wound were in contact, but the outer were far apart; and that along the whole wounded surface, no indication was to be found of any attempt at its closure; while I know of but two instances in which the edges of the uterine wound are said to have presented a granulating surface."

Ample confirmation of this statement is available from examination of post-mortem reports. The condition of the uterine wound is described in such terms as "flabby and gaping." (Radford 1851).

That union of the wound eventually took place if the woman survived the operation, there was no doubt, but that the scar was weak and liable to rupture at subsequent pregnancy was clearly demonstrated in a case reported by Winckel (1864). His patient, after four normal deliveries, developed osteomalacia. At her fifth confinement, she had a very severe labour, and, on becoming pregnant again, in 1860, Caesarean section was found necessary, and was successful. A further pregnancy three years later resulted in rupture of the uterus with a fatal result. At post-mortem examination, the rupture was found through the scar of the previous section, which was stated to be very thin. Sometimes the wound of the uterus became adherent to the abdominal wall, but its edges were closed merely by union of the peritoneum, and even when the union did go deeper, it was only effected by unyielding elastic tissue.

Commenting on Winckel's case, Martin of Berlin declared that in most cases of uterine section the outer layers of the incision retracted and only the inner remained in contact; hence the very thin scar. In other cases, where, following a successful Caesarean section, the uterus did not rupture during subsequent pregnancies, autopsies showed adhesions between the uterine and abdominal walls. On these grounds, Martin (1864) suggested uniting the uterine wound to the abdominal wall directly by sutures, so as to favour the formation of adhesions. This method was revived by Chunn as recently as 1888, but was not favourably received.

While Martin's idea was to strengthen the uterine scar, Van Aubel, a Belgian surgeon, in 1863, suggested something similar, but its object was to prevent the escape of the lochia into the peritoneal cavity. He proposed, during the operation, to keep the surfaces of visceral and parietal peritoneum in close contact, and, after reflecting the peritoneum of the uterus for about half an inch around the incision, together with a thin layer of muscle, to stitch together the parietal peritoneum and that of the uterus. The two lips of the divided peritoneum were to be brought into contact with the aponeurosis and stitched together with the glover suture. The external wound was united by interrupted sutures

and dressed in the ordinary way, complete closure of uterine and peritoneal cavities thus being obtained. Van Aubel, however, admitted that he spoke only from dissecting room experience; his novel suggestion was not adopted and did not receive the attention which it merited.

Sometimes however, the uterine wound healed remarkably well. In Schmucker's "Vermischte Schriften," a case was described illustrating this (Mansfield 1826). A woman six months pregnant was gored by a bull, the abdomen was ripped open, and an arm of the foetus protruded. Caesarean section was successfully performed. Some years later, a further pregnancy was followed by a normal delivery, but the woman died a few hours later from rupture of varicose veins in one of her ovaries. At autopsy, the old uterine wound was found soundly healed, and "scarcely visible."

No uterine sutures were employed in Great Britain until 1865, but their use was advocated by Spencer Wells (1864) at a meeting of the Obstetrical Society of London on April 1st., 1863. Wells said that he "was not aware whether sutures had been used in any case; but it had struck him that the escape of blood or of the secretions from the uterine cavity into the peritoneal cavity might be one of the causes of the mortality after Caesarean section, and if so, sutures might be useful. It was evident that the ordinary interrupted sutures could not be used, because they

would have to be left in spots where they were applied; but it would be easy to use the uninterrupted suture so that it might be withdrawn through the uterine cavity and vagina. It would only be necessary to leave both ends long enough and not to tie any knots. There would be no difficulty in doing this if it were thought desirable, and it might prove to be a means of lessening the mortality after Caesarean section."

When he made this proposal, Wells did not seem to be aware that his plan was by no means a new one, nor does the record of the proceedings show that any other member present knew this was the case. This suggestion was strongly opposed by Greenhalgh, Barnes and many others, they preferring to rely on the contractile property of the uterus. However, two years later, Wells (1865) did insert sutures into a gravid uterus. During an operation for removal of a left ovary, he found another tumour which he took to be a cystic right ovary, and proceeded to puncture it, two or three pints of blood-stained fluid escaping. It was then discovered that the punctured organ was the uterus. The rest of the story may be told in his own words "On withdrawing the cannula, a soft, spongy, bleeding mass protruded, and on putting my finger to push this back, and examine the uterine cavity, the anterior wall of the uterus, which was very soft and friable, as though it had undergone fatty degeneration, gave way along the middle line from the puncture (which was near the fundus) for an extent



of from three to four inches down the body towards the neck. With very slight pressure, a quantity of liquor amnii, and a foetus of five months escaped. I then easily peeled off the placenta from the inner surface of the uterus. The organ did not contract, and there was free bleeding from three vessels close beneath the peritoneum at the lower angle of the rupture of the uterus. These vessels were secured by three silk ligatures, oozing still going on from the surface where the placenta had been attached. I made a free opening into the vagina by passing my finger from above through the cervix and os, and then put a piece of ice into the uterus, and held it within by firmly grasping the organ, which then contracted. I then brought the peritoneal edges of the tear in the uterus together by an uninterrupted suture of fine silk, one long end of which I had previously passed into the uterine cavity, and out through the os into the vagina. By seven or eight points, the edges were brought accurately together, and the other end of the silk was brought out through the opening in the abdominal wall, with the end of the three ligatures in the vessels in the uterine wall, close to the pedicle, and were tied with a clamp." The sutures were withdrawn some days later, and the patient recovered. Routh and Savage, who were present at the operation, supported Well's suggestion to use sutures for the uterine wound. All honour is due to Spencer Wells for reporting such a remarkable incident - which might be termed an



"accidental Caesarean section."

Sir James Young Simpson (1865) appears to have been the next in this country to have made use of the uterine suture. On October 13th, 1865, he performed Caesarean section in a patient, 24 years of age, who had already been in labour  $4\frac{1}{2}$  days, and in whom efforts to delivery by version and use of the cephalotribe had failed. Although the patient was in a very weak state, Caesarean section was performed. The uterus was found to be ruptured, but the rupture was stated not to extend into the peritoneal cavity. "The wound in the wall of the uterus continued to remain open, and pour out a considerable quantity of blood. To restrain this haemorrhage, I was obliged to put two or three stitches of iron wire into the walls of the uterus itself, which seemed at once to restrain the dangerous effusion of blood." After rallying remarkably well from the immediate effects of the operation, the patient died 67 hours later. Simpson remarked "If she had been operated on sooner, she might have had a chance of recovery."

Silver wire sutures were first used in Great Britain by John Taylor in 1868. His patient was a primipara of 23, labour being obstructed by an exostosis of the sacrum, which reduced the anterior-posterior diameter of the pelvic brim to one and a half inches. Caesarean section was performed after she had been in labour about 18 hours. It is stated that the uterus was closed by sutures of silver wire,

but further details were not given. After recovering well from the operation, the patient developed a white leg, followed by pneumonia and she died suddenly 43 days after the operation. At autopsy, all the sutures with one exception, were found coated with fibrinous lymph, and adherent to the peritoneum covering the bladder. The lower part of the uterine wound was still patulous on pressure, but without any signs of inflammation or disease.

Professional opinion concerning the advisability of suturing the wound in the uterus evidently began to change about 1870, for in that year, and the one following, we find Braxton Hicks (1870) and Robert Barnes (1871) previously opposed to the procedure, describing a new method of doing it. Both used silver wire, passing through both the uterine and abdominal walls.

Hick's case was one in which labour was obstructed by a large uterine fibroid. The patient was in a state of extreme exhaustion when operation was performed, and severe haemorrhage resulted from the uterine incision, particularly from a large sinus about half an inch in diameter. "I passed the needle, armed with silver wire, completely through the wall about one quarter of an inch from the margin of the incision, and brought it out again half an inch lower down, thus enclosing the opening. After finding the haemorrhage had quite ceased from other parts, the wires were carried from within through the abdominal parietes and then fastened with those of

the opposite side. To make a more complete opposition, another suture, one inch lower down, was passed through the uterine and abdominal walls, and brought together as usual. Elsewhere the abdominal parieties only were transfixed."

The patient died on the fourth day following, and at post-mortem examination no extravasation of uterine contents into the peritoneal cavity was observed, although there had been much vomiting.

Robert Barnes (1871) suggested a modification of Hick's method, declaring that uterine sutures should fulfill four conditions, namely,

- (1) They should stop haemorrhage from the cut surface of the uterus.
- (2) They should secure fair apposition of the two lips of the uterine wound.
- (3) They should keep the anterior wall of the uterus in apposition with the abdominal wall so as to favour adhesion without causing dragging.
- (4) They should be easy of removal when they had fulfilled their purpose.

This method was rather a complicated procedure and is best described in his own words. "A needle armed with fine silver wire is carried perpendicularly through the uterine wall about half an inch from the edge of the wound near the upper angle so as to transfix the wall above any bleeding sinuses.

The wire is then carried through the same lip, back from within outwards below the sinuses. This leaves a loop in the internal aspect. The effect of this when the two ends are pulled upon is to compress the sinuses after the manner somewhat of Simpson's acupressure. Next the opposite side of the wound is fixed at the same level. This suture is made to pass through the loop of the first suture, before piercing the lower part of the wound to bring it out. There will now be two loops of wire which intertwine in the inner aspect of the uterus, and the four ends come out in the outer aspect to be carried presently through the abdominal walls. Before proceeding to this step, it is necessary first to pass a loop of silver wire over the crossing of the loop of the uterine sutures, and to carry the ends down through the os uteri and out by the vagina. The object of this is to keep a hold on the sutures with a view to their subsequent removal. The union of the uterine wound to the abdominal wound may now be effected. The four ends of the uterine sutures are now carried by needles through the abdominal walls crossing each other, i.e., the two ends emerging from the right side of the uterine wound are taken to the left side of the abdominal wound. The effect of this is that when the sutures are drawn upon and secured by twisting outside the abdomen, not only is the uterine wound drawn up close against the inner abdominal wall, but the uterine wound is also closed. To obviate the subsequent dragging from shrinking of the

uterus, it is better to pass the uterine sutures through the abdominal wall at a lower level, that is, nearer the pubis, than where they emerge from the uterus. Proper abdominal sutures are then adjusted and when all are in situ, they can be drawn tight and closed. To remove utero-abdominal sutures, which may be done on the seventh or eighth day, get an assistant to draw gently upon the clue line brought from the vagina whilst a finger of the left hand follows it up to its connection with the intra-uterine loops, which can then be divided with scissors worked with the right hand. The sutures can then be withdrawn by gentle traction upon the ends which rest upon the abdominal surface."

Braxton Hicks praised this ingenious device very highly, and was quick to avail himself of it. It was also advocated and used in France with very satisfactory results.

It would appear that surgeons were afraid to leave nonabsorbable suture material in the uterus, but no great harm appeared as a result. S. S. Lungren of America reported a case in 1881, where in performing Caesarean section for the second time upon a patient "the silver wire sutures were seen under the peritoneum as bright as when placed there five years ago. They were not disturbed, the uterine incision being made to the right of the former incision."

The improved results following suturing of the uterine wound did not however, lead to general adoption

of this procedure. Some writers were doubtful, others frankly antagonistic. Harris of America (1871) wrote "There may be some cases where the uterine wound should be united under pressure by sutures to avoid haemorrhage and gaping, even under the most favourable circumstances as to time and condition; but these are exceptional ones.....

The question of uterine and peritoneal toleration in the case of suturing the uterus has yet to be decided; that it appears important as a measure necessary to ensure recovery in some circumstances cannot be denied; neither can it be said that it would not be an improvement, provided it could be shown not to favour inflammation and that after union it would occasion no future trouble." He was also "disposed to believe that they do not materially add to the gravity of the operation."

Carl Schroeder (1873) wrote "By friction of the uterus complete apposition of the edges of the womb may be obtained. Failing this sutures may become necessary; but it is possible, their use is to be avoided."

Amongst the opponents of uterine sutures in this country was James Edmunds, an opinion which he repeated as late as 1902. Even Thomas Radford was against their use. In 1880, he wrote "I am strongly of the opinion that sutures ought not to be introduced into the uterine walls, and indeed, I think that they



would prove in general not only useless, but by the uterine tissue yielding they would be injurious."

A case described in 1871 by C. F. Rodenstein gives a good idea of the attitude of some surgeons towards the problem. On New Year's Day, 1871, he was assisting at a case of Caesarean section, and was requested to undertake closure of the womb. There was profuse haemorrhage from both uterine and abdominal incisions, and even after delivery of its contents, the uterus did not contract. Severe haemorrhage continuing, he carried silk sutures through the whole thickness of the uterine wall "on the spur of the moment", and by closing the womb firmly, bleeding therefrom was controlled. The surgeon in charge, on his return, strongly disapproved of Rodenstein's action, and to remedy the apprehended evils of this procedure, he opened the abdominal wound on the third day and removed the sutures from the uterus. Rodenstein was a strong supporter of the uterine sutures, considering that the rate of mortality of the operation would be reduced thereby. He also pointed out that although the uterus contracted firmly after section, and the wound apparently closed, at post-mortem it was found to be gaping. He also mentioned a case of Braxton Hicks, the patient dying from peritonitis, although the prognosis appeared excellent, Hicks remarking "I cannot but help thinking that, had the uterine



wound been closed in this case, many of the most serious complications would not have occurred."

While silver wire was the most satisfactory material in use, others were tried. Fine hemp was used by Townsend of U.S.A. (1867), while Foster (1870) tried silk for the first time.

Theoretically, carbolised catgut should have been the best material, but after numerous trials, mostly unsuccessful, the opinions originally given by Estep were confirmed, and use of this material fell out of favour. Martin of Berlin had a successful case in 1874 in which he closed the uterine wound by use of fourteen catgut sutures and treble knotting them, but failed in another in the way which happened so often - the sutures becoming loose before union was complete. Veit of Bonn also had two successful cases. His theory was that animal sutures became untied and fell into the cavity of the uterus to be discharged. Catgut was used in Britian by Alfred Meadows and C. F. H. Routh (1875), but their results were no better. The first two cases both died, and at autopsy, it was found that the sutures had come loose. Other writers such as Galabin (1876) reported similar experiences. Galabin also tried using silkworm gut in 1876, in a patient suffering from cancer of the uterus. Although his patient died, the stitches were found at post-mortem examination to be holding well. Silk, first used by Foster of U.S.A. was tried on the

continent by Gurtler of Germany in 1873, and Silvestre of Italy in the same year, both patients recovering. Braxton Hicks was the first to try this material in this country, in 1878. Operation was necessary owing to malignant disease of the vagina; the patient died, however, and at autopsy, the whole uterine wound was found gaping, every stitch having been torn away.

While the use of the interrupted catgut suture was not a success, continuous suture with the same material gave satisfactory results, and the method described by R. J. Kinkead of Dublin (1880) gave better results. He employed a long carbolised catgut suture armed with a needle at each end. Commencing at the upper angle of the wound, a needle was passed from within outwards on each side of the incision at the level of, or a little above, the termination of the incision. With the centre of the suture in the middle line, the right needle was passed through the left, and the left needle through the right, side of the uterus about half an inch from the edge of the wound, from without inwards, and so on from within outwards, and without inwards until the entire wound was closed, care being taken that the needles pierced the uterine tissue exactly opposite each other, and that the distance between the points inside the uterus should be less than that on the exterior. When the lower angle of the uterine

incision was reached, one end was drawn through the os uteri and vagina with the assistance of a piece of silver wire or a catheter. The other end of the suture was drawn through the abdominal wound. These two ends were allowed to remain until they dropped off following absorption of the material in the wall of the uterus.

These early efforts to close the uterine wound did not at first appear to influence greatly the maternal mortality. Thus, between 1867 and 1878, out of sixteen cases of Caesarean section in U.S.A., the uterine wound was sutured on ten occasions, but only four of these recovered. However when the six fatal cases are subjected to close examination it is found that only two of these were in a favourable condition prior to operation. It was the old, old story of the operation being a last resort, after everything else had been tried and failed. The advent of the new Porro operation in 1876, rendered any consideration of the uterine wound unnecessary, but the new procedure devised by Sanger quite overshadowed these early ingenious attempts to wrestle with this vital problem of a gaping wound of the uterus.

It is remarkable to note in passing that some of our present day surgeons appear to be quite unaware of these early attempts to suture <sup>the</sup> of uterine wound. One of the best known British obstetricians wrote in 1921 "The modern operation of Caesarean section

dates back to the eighties of last century.

Then it was that Sanger introduced suture of the uterine wound which brought the operation within the scope of practical obstetrics; previously the uterus had been left unstitched, and only occasional successes were recorded."

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(5) The "Sanger" Operation.

The year 1882 was an outstanding one in the history of the operation of Caesarean section, for in that year, a new technique in the treatment of the wound of the uterus was evolved by Max Sanger, a German surgeon, (1853 - 1903). Sanger himself, did not discover the various procedures of the different and successive steps in his method of operating - he made no such claim - but by careful study, painstaking observation, research and experiments, he was able to formulate a method which created a revolution in obstetric surgery. His improvement consisted essentially in the adaption of Lembert's intestinal suture for the superficial sutures of the uterine peritoneum, and in the use of a large number of sutures, deep and superficial, to secure perfect closure of the uterine wound, so that the lochial discharge was prevented from reaching the peritoneum.

This method, which came to be called the conservative Caesarean section, or Sanger operation, secured a uterus in a condition almost similar to an uninjured organ, provided against both primary and secondary haemorrhage, and reduced the liability of peritonitis to a minimum. Sanger declared that any operation intended to take the place of craniotomy in the case of a living foetus must fulfil these



conditions - preservation of the mother, of the child, and of the genital organs. This last point he stressed, presumably owing to the ever increasing popularity of the Porro operation introduced but a few years previously. He claimed that the conservative Caesarean section could fulfil these conditions, provided it was performed sufficiently early in labour and with strict aseptic precautions.

The technique of the Sanger operations was as follows. The bladder was emptied, the vulva shaved, and the abdominal wall, vagina and external genitals carefully disinfected. Following an incision in the linea alba about sixteen centimetres long, three sutures were passed through the lips of the abdominal incision, near its upper end, to be drawn upon as a bridle in order to rapidly close the abdominal wound after eventration of the uterus. The membranes were now ruptured per vaginam, if this had not already occurred. If possible the uterus was now drawn out of the abdomen and held vertically. A sheet of waterproof material, moistened with a five per cent solution of carbolic acid, was next made to enclose the cervix and cover the abdomen to protect its cavity against the entrance of fluid. The ligatures were then drawn upon to close the abdominal cavity around the cervix, the uterus incised longitudinally on its anterior aspect, and the foetus removed. If

the uterus had not been turned out, manual compression was made as a haemostat upon its lower segment. If the uterus was turned out before it was incised, manual compression was likewise used or a clamp applied to the broad ligament or an elastic tube applied to the cervico-uterine cone, after the plan of Esmarch. Following evacuation of the uterus, any haemorrhage from the wound was checked with haemostatic pincettes. When the uterus was well contracted, a utero-vaginal drainage tube was inserted and the uterus cleaned out with a carbolised sponge.

Next came the most important step in the operation and that which constituted the greatest advance in technique - the new method of suturing the uterus. First, the peritoneum was stripped off the uterine wall to the extent of about five centimetres on each side of the uterine incision, and thereafter, a wedge shaped portion of the uterine wall, two centimetres in width, was resected, having its thick edge next to the peritoneum and its thin edge next to the uterine cavity. The free edges of the mobilised peritoneum were now turned in over the muscular layer and the stiches inserted. These consisted first of deep sutures of silver wire which penetrated the peritoneal and muscular layers but avoided the decidua. Superficial sutures of silk were then inserted at short intervals, so as to secure the turned-in peritoneum and keep its serous

surfaces in contact, thus making a secure welt. The number of deep sutures was usually about eight or ten, while the number of superficial sutures was usually about twenty or more.

The elastic ligature was then removed, the abdominal wound closed in the usual manner, and purely expectant treatment adopted, in the absence of untoward symptoms.

The sero-serous welting of the peritoneum originated with Jobert who applied it to intestinal wounds. Further, the interrupted superficial suture of the peritoneum, by which its serous surfaces were kept in apposition was devised by Lembert for intestinal closing, but it was Sanger who first advocated the application of the Jobert-Lembert system of suturing to the uterine peritoneum in Caesarean section, and who also advocated the importance of employing many deep and superficial sutures to the uterine wound.

As we have seen, the uterus had been sutured many times before, but no one had turned in the peritoneum and, in most cases, only a small number of sutures had been employed. In 1874, R.O. Engram, of Georgia, U.S.A., in performing Caesarean section, after efforts to deliver a difficult case by craniotomy had failed, sutured the uterus with carbolic silk, employing three deep stitches, three more superficial and four embracing the peritoneum

only. His patient recovered, but the value of his success was lost by reason of the fact that the case was not reported until 1885.

The value of the multiplicity of sutures lay in the fact that the gaping force was so divided as to reduce very materially the undivided tension on each stitch, and thus was prevented, what was so often found at autopsy, a gaping wound through which lochial discharge found its way into the peritoneal cavity.

The first to avail himself of Sanger's suggestions was G. Leopold of Leipsig, who on May 25th, 1882, operated on a patient, 29 years of age, with a generally contracted pelvis having a diagonal conjugate of  $2\frac{3}{4}$  inches. Her condition at the time of operation, which took place after she had been in labour 12 hours, was described as favourable, and Sanger's method was followed exactly. The child survived and the mother made a smooth recovery.

The second "Sanger operation" was performed by O. Beumer, of Greifswald, on September 11th, 1882. His patient was a six-para requiring Caesarean section owing to the presence of a retro-cervical fibro-myoma. She was in poor condition at the time of its performance, suffering from cystitis and pyelitis, from which she succumbed forty hours after operation. The child, however, was saved. Seven deep and four superficial sutures of fishing gut were used.

The third, on October 6th, 1882, was by an American surgeon, H. J. Garrigues, of New York. His patient was a primipara aged 30, suffering from a kyphotic pelvis. Like that of Beumer, his patient was in a bad state at operation, being exhausted by ante-partum haemorrhage. She died some 50 hours after operation, and the child was lost. Garrigues did not resect the muscular layer of the uterus, but did turn in the peritoneum and closed the wound with 24 silk sutures, twelve deep and twelve superficial. At autopsy, the uterine wound was found entirely healed. Garrigues preferred silk to other suture materials, deeming it softer and less irritating than non-absorbable silk-worm gut, and more reliable than cat-gut, which was apt to come loose.

Mention of Garrigues brings to mind the controversy which developed between him and Sanger, he strongly objecting to the new technique being coupled with the name of the latter. Garrigues (1888) declared that when he performed his operation in 1882, he had never heard of Sanger's writings, nor of Leopold's first successful operation. He added that "There is little ground for attaching a single man's name to the operation in its present shape, which is the beautiful outgrowth of general surgical and special gynecological development, an evolution due to the combined efforts of many men working independently of each other in different countries, especially Lister in Scotland, Spencer Wells in England, Guenoit in France,

P. Muller in Switzerland, Leopold in Germany, and last but not least, Lungren in the U.S.A."

Sanger's method of suturing the uterine wound, he declared, had already been performed by others, notably Lungren, Baker, and Spencer Wells.

Examination of the writings of these surgeons, however, proved that Garrigues was entirely wrong. Thus Lungren, (1882), discussing the uterine suture in a case of repeated Caesarean section, stressed the fact that the sutures should avoid eversion of the lips of the uterine wound, and inserted his stitches in such a manner as to bring the peritoneal surfaces into contact. He neither undermined the peritoneum nor did he resect a wedge of muscle. He inserted five stitches only, of silver wire, carefully avoiding the uterine mucous membrane.

Moses Baker (1881), in a case of Caesarean section, necessitated by the presence of fibroid tumours of the uterus, inserted four sutures of carbolised silk into the uterus "not through the entire thickness of the walls, but passed in near the mucous surfaces and out a short distance from the incisions, through the peritoneal coat, so that when they were tied, they brought the peritoneal coats together first." He made no mention of a double layer of sutures.

Spencer Wells (1881), in his writings stressed



the necessity for bringing the peritoneal edges of the uterine wound together after removal of a tumour. He wrote "I insist that the peritoneal edges of the divided uterine wall, or of the connecting part of the out-growth of the uterine wall, should also be carefully brought together.... by many sutures, or by an uninterrupted suture along the whole length of the gap." Garrigues took this to mean that Wells "first put in deep sutures to arrest haemorrhage, and afterwards, superficial ones in order to obtain agglutination of the peritoneal surfaces" - which seems rather a stretch of imagination. Also his remark "that he (Wells) speaks of tumours and not of Caesarean section, does not make any difference" was absurd.

Garrigues also referred to the technique evolved by Kehrer about the same time as that of Sanger. Kehrer (1882) used a method of double suturing, the first layer uniting the whole thickness of the uterine wall, but excluding the peritoneum, which was united by second layer of sutures, which also included the most superficial layer of the uterine muscle." This method was slightly different from that of Sanger, who in his writings referred to it.

Sanger (1887) made a very able reply to Garrigues charges, completely vanquishing the latter in a contest, which even surgeons in U.S.A. admitted ended in a victory for Sanger.

The controversy, however, like most others,



was not without benefit, in that it drew the attention of practitioners in U.S.A. to the new technique.

Leopold (1884) in 1883 and 1884 had two more successful cases in which he followed out Sanger's method exactly, but in 1885, reported two others, both successful, with a modified technique. In these, he omitted the resection of a portion of the uterine wall, as he considered it an unnecessary detail. In his accounts, he made the following important recommendations:-

- (1) Reduce vaginal examination to a minimum, and disinfect the internal and external organs of generation with a 1-2000 solution of sublimate, or a 3 per cent solution of carbolic acid.
- (2) Operate early - preferably towards the end of the first stage of labour.
- (3) Employ only trusty assistants familiar with all steps of the operation.
- (4) The uterine incision to be made downwards only as far as the reflection of the peritoneum, and enlarged if necessary towards the fundus.
- (5) The uterus to be brought out of the abdomen after removal of the child, but before removal of the placenta.
- (6) Apply the elastic ligature round the cervix to control haemorrhage.

- (7) The serous coat to be stripped, and the muscular coat to be resected only when the serous coats do not easily slide over the muscular layer of the uterine wall.
- (8) The deep sutures to be of silver wire avoiding the decidua; the superficial to be of silk, and should pierce the serous border twice at the middle of the incision, but only once towards the end.
- (9) After suture of the uterus, remove the ligature and treat the abdominal wound in the usual manner.

It is rather remarkable that Sanger himself did not operate according to his suggestions until 1884. According to the first twelve cases collected by Harris, (1885), Sanger's case was the tenth on that list which recorded all of the new operation up to December 4th, 1884. Sanger's patient was a primipara of 21, with flattened and generally contracted pelvis. His original technique was followed out. The mother made a good recovery and the child was saved.

In the series just referred to, Leopold was the operator in five of the cases, four of whom recovered. Three were from U.S.A., but all perished, being in an unfavourable condition at the time of operation.

Leopold's modification of Sanger's original technique was approved by the latter when the new method came before a meeting of the German Gynecological Society in 1886. In a paper read by him, Sanger (1886), recommended a simplification of the operation. His chief points were;

- (1) Uterine incision to be made with that organ in situ, but to be turned out after extraction of the child.
- (2) Uterus to be surrounded with a napkin, and another to be spread over the intestines.
- (3) Manual detachment of the placenta.
- (4) Disinfection of the uterine cavity with iodoform.
- (5) Insertion of sponge or strip of gauze into the uterine cavity during insertion of the deep sutures.
- (6) Great care to be taken to ascertain that the haemorrhage is completely arrested before returning the uterus to the abdomen.
- (7) No drainage to be employed.
- (8) Injections of ergotin if necessary.

Leopold who was present at the meeting recommended turning out the uterus from the abdomen before incising it, and did not consider mobilising the peritoneum necessary. He had, as we have

already seen, abandoned the resection of a muscular wedge.

Kaltenbach pointed out that the sero-serous suture had been recommended and performed by others before the modified Caesarean section had been introduced. With the simplified technique, he declared that nothing was now left of Sanger's original method except the sero-serous suture. While this was up to a point true, the sero-serous suture was the greatest technical advance and constituted the greatest improvement in the operation, an innovation entirely due to Sanger. Kaltenbach's remarks were seized and enlarged upon by Garrigues when he returned to the controversy in 1888.

The new operation had a remarkable run of success in Germany. Thus out of 33 Sanger operations performed in that country up to March 1887, 29 mothers and 32 children were saved - a truly remarkable result. Out of 17 similar operations performed in other countries, 6 women were saved, giving a 30 per cent mortality out of the first 50 Sanger operations. This compared most favourably with the first 50 Porro operations in which the maternal mortality was 60 per cent - exactly double. (Harris 1887).

While the operation was frequently performed in Germany, other countries were slow to adopt the

new method, and, sad to relate, none slower than Great Britain. The 17 operations mentioned above were spread over no fewer than six countries, viz:- Austria, five, United States, five, Italy three, Russia two, France and Switzerland one each, (Harris 1887).

The splendid success of German operators continued, and in Leipzig alone, from 1882 to 1891, 35 operations were performed with but two deaths, one from peritonitis, and one from uraemia. Professor Zweifel had the remarkable record of 18 cases with but one death. (Harris 1891).

Countries outside Germany were less fortunate - or perhaps less skilful. Thus the first five attempts in U.S.A. all ended in disaster, and not until 1887, was the first success recorded by W. T. Lusk. His patient had a deformed pelvis, owing to hip disease during childhood. At the operation, sixteen deep and eighteen superficial sutures were employed to suture the uterus, carbolised silk being used. After a stormy convalescence, during which abscesses in the abdominal wound and in the hip joint had to be opened, the patient made a good recovery. The child was saved.

While the work and writings of Sanger received but little notice in the U.S.A., except for the controversy between him and Garrigues, they

received even less in Great Britain.

At the annual meeting of the British Medical Association in 1886, a discussion was held on the relative merits of craniotomy and Caesarean section. R. Barnes (1886), who was one of the principal speakers, did not mention any of the improvements suggested by Sanger. R. J. Kinkead who followed, betrayed at least some knowledge of recent reforms, and was acquainted with Leopold's first operation, but quoted both it, and Sanger's methods, incorrectly. W. T. Lusk, of New York, who was present, mentioned the wonderfully improved results from the new technique, quoting 19 recoveries in 26 cases, the seven fatal operations being performed in circumstances well-nigh hopeless.

Not until March, 1888, was the first successful Sanger operation performed in England, although Arnott (1887), had previously described successful operations performed by him in India.

In February, 1889, Sir Francis Champneys (1889), of London, drew attention to the value of Sanger's improved technique of the conservative Caesarean section, and described a successful case of his own performed in March 1888, emphasising particularly musculo-muscular and sero-serous sutures. This paper was definitely epoch-making, and stemmed the tide which had set in, in favour of Porro's more radical and sterilising operation.

During the following three years, the Porro operation was performed in Britain nine times with one death, and the conservative Caesarean section 18 times with 4 deaths. Champneys showed that the increasing success of Caesarean section had put an end to its limitations to cases of absolute contraction, where the child could not be delivered per vias naturales, and that its limits should now extend upwards into the class of relative contractions. He considered, that if it could be shown in a given case, that Caesarean section was not more dangerous to the mother than craniotomy, the former should be the operation performed. He declared that the days were past when craniotomy should be considered in a case with a conjugate of the brim below 2 and a half inches.

In April, 1888, Murdoch Cameron (1889), of Glasgow, had another successful Sanger operation, and in 1891, he published a series of ten cases with but one death, stamping himself, along with Sir Francis Champneys, as the pioneer of the modern operation in the United Kingdom. In advocating Caesarean section in preference to craniotomy he said, "I think the time has come when the lives of the mother and child may alike be saved, and I prefer to think that an infant, come to maturity, is destined for something greater than to have its glimmering life extinguished by an accoucheur skilled in the use of a



dreadful perforator." He went on "Let our motto be - we live to save, not to destroy."

In support of his contention, he mentioned, the case of a woman, who, between 1862 and 1885, endured 11 pregnancies, 8 of which ended in embryotomy, and in the three others labour was induced at half-term. No further proof is needed of the great dread of Caesarean section at this time.

Cameron also modified Sanger's technique slightly, inserting from seven to twelve deep stitches only, reserving superficial sutures for any point where it might be thought advisable to use them in order to secure more accurate co-aptation of the edges of the uterine wound. He objected too, to the use of a tourniquet, believing that it often induced uterine inertia.

Sanger's operation has remained largely unchanged until the present day, although various modifications have been suggested, such as that of Dudley (1895), who employed a triple row of sutures. The first included the decidua and inner layer of muscle, the second the middle layer of muscle and uterine sinuses, and the third the peritoneum and superficial muscular layers. The continuous cat-gut suture was used throughout all three tiers, a procedure which Dudley claimed, brought the entire depth of the uterine incision into much closer contact than interrupted sutures. While the method proved successful in his

hands, it did not supplant the Sanger technique.

Munro Kerr in 1916, also recommended a triple row of sutures. He used five interrupted stitches of fine silk as splint sutures, these including the whole thickness of the muscular coat of the uterus. By means of catgut, the two edges of the mucous membrane were co-apted with a continuous suture. A similar superficial suture was inserted and thereafter the through-and-through stitches were tied.

Arnott, W.	(1887)	Edin.Med.Journ.	<u>33</u> ,405.
Baker, M.	(1881)	Am.J.Obstet.	<u>14</u> ,599.
Barnes, R.	(1886)	Brit.Med.Journ.	<u>2</u> ,625.
Beumer, O.	(1882)	Arch.f.Gyn.	<u>20</u> ,409.
Cameron, M.	(1889)	Brit.Med.Journ.	<u>1</u> ,180.
Ibid.	(1891)	Ibid.	<u>1</u> ,509.
Champneys, F.	(1886)	Trans.Obstet. Soc.London.	<u>31</u> ,136.
Dudley, A.P.	(1895)	Am.Journ.Obstet.	<u>31</u> , 16.
Garrigues, H. J.	(1883)	Am.Journ.Obstet.	<u>16</u> ,344.
Ibid.	(1886)	Ibid.	<u>19</u> ,1016.
Ibid.	(1888)	Intern.Journ. Med.Sci.	<u>95</u> ,439.
Harris, R. P.	(1885)	Am.Journ.Med. Sci.	<u>90</u> ,370.
Ibid.	(1886)	Intern.Encyclo. Surgery.	<u>6</u> ,768.
"	(1887)	Medical News.	<u>50</u> ,344.
"	(1891)	Am.Journ.Med. Sci.	<u>102</u> ,371.
Kehrer, F.A.	(1882)	Arch.f.Gynak.	<u>19</u> ,196.
Kerr, J.M.M.	(1916)	Operative Midwifery, 3rd Edit. London.	
Leopold, G.	(1882)	Arch.f.Gynak.	<u>19</u> ,400.
Ibid.	(1884)	Ibid.	<u>24</u> , 3.
Ibid.	(1885)	Ibid.	<u>26</u> ,407.
Lungren, S.S.	(1882)	Am.Journ.Obstet.	<u>15</u> , 92.
Lusk, W.T.	(1887)	Medical News.	<u>50</u> ,527.
Sanger, M.	(1882)	Arch.f.Gynak.	<u>19</u> ,370.
Ibid.	(1886)	(Intern.Encyc.Surg.)	<u>6</u> ,768)
Ibid.	(1886)	Am.Journ.Obstet.	<u>19</u> ,883.
Ibid.	(1887)	Ibid.	<u>20</u> ,503.

Wells, S. (1881) Brit.Med.Journ. 1, 909.

Zinke, G. (1888) Journ.Am.Med.Assoc. 12, 413.

(6.) Treatment of the Abdominal Wound.

The method of treatment of the abdominal wound has also been the subject of considerable dispute, some considering suturing necessary, some considering the use of plaster and bandages sufficient.

Rousset and Ruleau advised that the abdominal wound should be stitched and recommended the use of curved needles, two in number, and threaded with waxed silk or thread, two lines in diameter. Two needles were employed for each stitch and threaded with a single strand. They did not stitch up the whole of the wound, but left a gap at the lower end into which they inserted a tent of rolled soft linen, soaked in balm, and fixed in the gap by a thread. These surgeons also drew attention to the danger of pricking the intestine with the suture needles and also to the danger of nipping the bowel in the wound.

The great majority of their successors followed suit, differing only in minor details, but all recommended that the peritoneum should not be included in the sutures. Some passed them through the skin and muscles, some through the skin only.

Baudelocque advised the use of the quilled suture for the abdominal wall but only two or three were recommended for the upper two thirds of the wound. They were to be tied with bows so that they could be adjusted if necessary. Munro on the other hand, quoted by Hamilton, suggested the glover's stitch at

"three fourths of an inch distance." The latter was the first to suggest that the wound should be closed entirely, although Sanger in his book published in 1882 gave credit for this to Reiche in 1854.

During the nineteenth century, the procedure was very similar, pins, wire or silk sutures being employed but only one series of sutures was introduced. On occasions, this was reinforced by narrow strips of adhesive plaster as recommended by Burns, (1834). The closing of the abdominal wound layer by layer, is a modern development.

Although it may be surprising to modern readers, there were those who, towards the end of the eighteenth century and at the beginning of the nineteenth, proposed that sutures should not be employed for the abdominal wound, considering that the application of plasters and bandages, the patient lying on her side, being sufficient. Lauverjat, and after him Sabatier, were of such an opinion but their views were strongly opposed by many of their colleagues, including Siebold.

In many of early cases of Caesarean section, considerable prolapse of the intestine through the abdominal wound took place. In such cases the integuments required to be kept in position by something stronger than adhesive plaster.

Mursimma described a case which demonstrated

this point very forcibly. Reporting a case of Caesarean section, he wrote "After the contraction of the uterus, the intestines protruded so forcibly that various means were tried in vain to effect their apposition (the edges of the abdominal wound) and keep the wound together. The intestines were distended with flatus, rolled under our hands, and protruded out of the wound. I never anticipated anything of the kind and never saw it before. It is indescribable with what pains they were obliged to be kept back. It appeared as if the cavity of the abdomen was too small to contain them and I was obliged to relinquish my plan of procuring union of the wound by means of adhesive plasters and to employ sutures." (Mansfield 1826).

Playfair(1886) stressed the advisability of not closing the abdominal wound until all haemorrhage was completely stopped since, he considered any escape of blood into the peritoneal cavity would prejudice the chances of the patient's recovery by increasing the risk of peritonitis. In a successful case reported by Newman, the abdomen was not closed for nearly an hour (1867).

After closure of the abdominal wound, wholly or partially, by sutures or plasters, a compress was applied, usually moistened with some substance. Rousset and Ruleau used aromatic wine for this purpose, Baudeloque the white of an egg beat up in



water and "quickenened with a little spirit." On top of the moist compress a dry one was applied, followed by a bandage. From this, the dressing passed through the antiseptic stage to the modern aseptic methods.

Before passing to the after treatment, the question of drainage, abdominal and pelvic, may be considered.

Mention has already been made of the practice of leaving the lower end of the abdominal wound unstitched. The "tent" of Rousset and Ruleau was kept in the lower part of the wound to give issue to various discharges, but was reduced as these grew less and was finally withdrawn when they ceased. These surgeons also recommended the injection, through the wound, into the uterus of herbal decoctions, should such be thought necessary. Guenin advised that the neck of the uterus be cleaned from time to time by pouring warm wine into it, and, if necessary, insinuation of a finger through the wound into the neck of the uterus. Such a suggestion was supported by Baudelocque, who used an unravelled bandage for this purpose. It is scarcely necessary to add that many of the early accounts of Caesarean section report the exit of foul smelling discharges through such openings.

The originator of pelvic drainage, at least in theory, was R. W. Johnson, the first to suggest a low transverse uterine incision. In the first edition of

his book (1769), he wrote concerning Caesarean section, "Could an aperture be made with safety at the bottom of the pelvis when hysterotomy is performed, in order to give vent to these humors, the probability of the mother's recovery would be greater; but how such an opening can be effected, I will not take upon me to determine; nay, indeed, I must confess that I think it hardly possible."

The only surgeon to perform drainage by this method was Cohenstein who favoured drainage through the pouch of Douglas in connection with a posterior longitudinal uterine incision as previously described.

Various ingenious procedures were adopted to assist abdominal drainage during the years immediately prior to the introduction of the Sanger or conservative operation. If it was thought to be required, and in view of the fact that many of the cases were of the "infected" variety, it frequently was. Hegar's capillary drainage, based on the principle of capillary suction, was very popular. For this purpose, a glass tube 16-18 cm. long, and 10-12 mm. wide with side openings near the closed end, was introduced behind the uterus. The open end was fixed into the abdominal wall between the sutures and terminated in the abdominal dressing. It was surrounded with and stoppered by carbolic

cotton, the whole being covered with protective. A wire, wound with absorbent carbolised cotton, was left in the tube in order to suck out such fluid as might collect. From time to time, in the beginning every hour, later at longer intervals, stopper and wire were removed, the glass tube wiped dry with other wires wound with cotton and a fresh one left in the tube. One advantage of this method was that it could be carried out with the minimum disturbance to the patient, (Lungren 1883).

In America, Lungren (1883) placed a fenestrated rubber tube, about six inches long, along the line of the uterine incision and secured it in the lower angle of the abdominal wound by passing an iron wire through it and through the abdominal parietes.

In Germany, two much more elaborate procedures were devised by Frank and Kehrer in 1881 and 1882 respectively. The former placed a drainage tube about as thick as a thumb, so as to reach from the orifice of the vagina, through the uterus, to the lower end of the abdominal wound, and yet another placed at the bottom of the utero-vesical pouch beginning and ending at the same points as the first. The uterus was closed above the drainage tubes with catgut sutures. By stitching the two round ligaments together and fixing their lower parts to the parietal peritoneum, a kind of tent was built over the uterus, forming a barrier between it and the peritoneal cavity. A third drainage tube was then

placed in front of the uterine wound, ending with the two others at the bottom end of the abdominal wound. Needless to add, such a complicated procedure was not generally adopted.

Kehrer of Heidelberg, in 1882, also recommended the use of three drainage tubes in association with his low uterine incision, one small tube to lie on either side of the vesico-uterine pouch and a third, larger and longer, to pass over the uterus into the pouch of Douglas, all three being brought through the abdominal wound.

From the devising of such elaborate methods of drainage, it is very evident that the surgeons expected the healing of the patient's wound to be accompanied by much discharge.

Neither Leopold nor Sanger were in favour of drainage of any kind and for some time after, it fell out of favour in the performance of Caesarean section; there is little or no mention of it in the literature of the time. Surgeons were inclined to refrain from performing Caesarean section on cases sent into hospital for treatment after manipulation and frequent vaginal examinations - in other words, in suspect cases, many of which were frankly infected especially if forceps had previously been applied and caused injury to the soft parts. If Caesarean section was performed, it was generally followed up by hysterectomy.

Abdominal drainage is but seldom employed nowadays although it is preferred by few such as Daels, who, in 1933, recommended an intra-uterine-vaginal drain and in addition, a drain passed through the lower part of the abdominal and uterine wounds. These two tubes were united in the form of a T.

Dails, F.	(1933-4)	Arch.f.Gynak. <u>156</u> , 233.
Frank, F.	(1881)	Central.f.Gynak. <u>5</u> , 598.
Kehrer, F.A.	(1882)	Arch.f.Gynak. <u>19</u> , 177.
Lungren, S.S.	(1883)	Am. Journ.Obstet. <u>16</u> , 603.
Mansfield, D.	(1826)	Edin.Med.Journ. <u>25</u> , 227.
Newman, W.	(1867)	Trans.Obstet.Soc. London, <u>8</u> , 343.
Playfair, W.	(1886)	The Science and Practice of Midwifery, 6th, Edit. London.

and text books already quoted in previous sections.

Chapter VIMODERN INDICATIONS FOR CAESAREAN SECTION

Treatment of infected cases; rupture of the uterine scar; the abuse of the operation.

We have already seen how, in the days before Sanger devised the new method of Caesarean section, there was practically only one indication for the operation, namely deformity of the pelvis and that of an extreme degree. Various writers gave other indications but, apart from obstruction to labour resulting from ovarian and other tumours, the operation was practically never performed on their account.

With the ever improving results from the new method of operating, the indications quickly became extended, to such a degree in fact that, as we shall presently see, the operation became greatly abused. There is hardly one of the graver complications of parturition which has not been mentioned as a suitable indication, in special circumstances, for Caesarean section.

The indications for the operation are often divided into two classes, the absolute and the relative. Absolute indications exist when delivery per vias naturales is impossible. Relative may be described as those in which the operation is calculated to be safer for the mother or the child, or both, than delivery per vias naturales or where very rapid delivery is necessary and the cervix is still undilated.

The subject of contracted pelvis will be first



considered, At the end of the nineteenth century, text books generally described the absolute indication for Caesarean section as being present when the conjugate vera measured 5.5 cm. or less and the relative indication when it measured between 5.5 and 7 or 7.5 cms. In the latter case, Caesarean section or craniotomy, possibly in a living child, were usually necessary.

In 1901, J. Whitridge Williams of Baltimore proposed that these indications should be extended, the absolute from 5.5 cm. to 7 cm. and the relative from 7 or 7.5 cm. to 8.5 cm. in flat and 9 cm. in generally contracted pelves. In a case with the absolute indication, he advised that the operation be performed at the end of pregnancy or just after the onset of labour. For those with a relative indication, he recommended that the woman be allowed to go into labour, complete the first stage and enter the second. If the head was firmly engaged, labour was allowed to proceed. If there was no engagement, he advised Caesarean section, provided the patient was uninfected, the child in good condition and the surroundings suitable.

As Williams freely admitted, these views were markedly at variance with those expressed a short time previously by Kronig (1901) and Veit (1901), according to whom, Caesarean section was unjustifiable for the relative indication after rupture of the membranes. Kronig recommended symphyseotomy in such cases while Veit believed that the decision in favour of Caesarean section ought to be made before the onset of labour.

Williams, however, did not consider that the maternal mortality would be appreciably increased if women were allowed to go into the second stage of labour, provided they were not infected, an opinion subsequently shown by such writers as Routh (1911) and Holland (1921) to be inaccurate.

Williams recorded 278 cases of contracted pelvis in which spontaneous delivery occurred in 71.58 per cent. This figure rapidly decreased in frequency as the contraction became more marked, as shown in the table below:-

C.V.	Per cent. Spontaneous Deliveries.
Between 10 and 9 cm.	77.28
" 8.9 and 9 <sup>8</sup> cm.	61.54
" 7.9 " 7 cm.	33.5
" 6.9 or less	nil.

The measurement of the conjugate in which Caesarean section was considered justifiable became still more increased. Routh in 1911 laid down the following rules:-

- (1) Cases with a C.V. below  $2\frac{1}{2}$ " - Caesarean section at term or early in labour, followed, if infected, by hysterectomy or Maxwell's irrigation.
- (2) Cases with a C.V. between  $2\frac{1}{2}$ " and 3" - Caesarean section if the child is alive or perhaps craniotomy if infected: every case to be

judged on its merits, considering severity of infection if present and state of child.

- (3) Cases with a C.V. between 3" and  $3\frac{1}{2}$ " -

Caesarean section in a clean case; craniotomy if the child was dead.

- (4) Cases with a C.V. over  $3\frac{1}{2}$ " - Caesarean section only if the child's head be unduly large: most of these can be delivered by forceps or version.

In modern times, these rules are still correct. Speaking generally, Caesarean section is usually done whenever the conjugate vera is below  $3\frac{1}{4}$ ". In some cases, it may be necessary with a measurement above that figure or unnecessary with one below it. Every case requires to be judged on its merits; measurements of the pelvis are not the important factor in border line cases but rather the relation between the size of the pelvis and the size of the foetal head, a point stressed 150 years ago by Baudelocque.

The extent to which Caesarean section became to be increasingly performed for cases of contracted pelvis is well shown by the figures, quoted by Routh (1911), for the Queen Charlotte's Hospital, during the two decades 1890 to 1899 and 1900 to 1909. In the first of these, before Caesarean section was generally practised, out of 10,529 cases, there were 135 of contracted pelvis with a C.V. of  $3\frac{1}{2}$ " or less. Caesarean section was performed on but 7 of these while 2 were dealt with by symphseotomy and 28 by craniotomy. The total foetal mortality in these 135 cases was 58.5 per cent. and the maternal

2.90 per cent. In the second decade, 1900 - 1909, out of 15,222 cases, there were 259 similarly contracted pelves. 74 of these were dealt with by Caesarean section with 3 maternal and 8 foetal deaths. Symphyseotomy was performed but once and craniotomy on 13 occasions. The total foetal mortality in these 259 cases was 22.4 per cent and the maternal 2.31 per cent. While the saving of maternal life was not great - 0.65 per cent. there is a remarkable difference, 36 per cent. in the foetal mortality.

Caesarean section is sometimes required for contraction of the pelvic outlet as pointed out by Getman (1917). "It is sometimes easy to get a head into a pelvis but difficult to get it out." This applies particularly to the funnel type of pelvis although pubiotomy has been favoured by some for such a difficulty.

Contraction and deformities of the pelvis still constitute the most frequent condition requiring the performance of Caesarean section (see tables on page 263.)

Obstruction to labour from tumours situated in the pelvis is the next oldest indication for Caesarean section. Fibro-myomata seldom seriously disturb parturition and the same may be said for ovarian tumours. In Routh's series there were 28 cases requiring the operation and 39 in that of Holland.

Of other rare pelvic tumours causing obstruction to labour, mention may be made of those reported by G.F. Blacker, one in which a calcified hydatid cyst

necessitated Caesarean section (1908), and others mentioned by him of vesical calculus obstructing labour (1910). W. Duncan, in 1898 described a case of cancer of rectum requiring Caesarean section and others have been reported.

Dystocia following ventrofixation of the uterus has occasionally necessitated Caesarean section. A Routh (1911 b) collected 8 cases of this kind.

Cancer of the cervix or vagina or stenosis of these organs became included in the indications for the operation. The latter particularly applies to elderly primiparae although Caesarean section has been done on a multipara who has been badly lacerated at a previous confinement. The difficulty in obtaining satisfactory union on a second occasion is well known. Cases in this class were amongst the indications given by some of the earliest writers, although seldom performed on this account.

Caesarean section for all cases of breech presentation in primiparae has been advocated by some writers such as J. T. Williams (1916). The reason given was that such a presentation in a primipara always meant "some disproportion between the foetus and pelvis or between the foetus and uterine cavity. Unless it can be definitely established that this disproportion is one of absolute or relative small size of the foetus, Caesarean section before the advent of labour should be the method of choice for delivery."

While it is true that some degree of disproportion sometimes does exist in such cases (10 to 12 per cent. of all hospital cases according to Munro Kerr 1937), Caesarean section is not usually necessary in more than 2 per cent . of all cases.

Williams, on the same grounds, advocated Caesarean section for all cases of face, brow, occipitoposterior and transverse presentations and also for all primipara over 35 years of age. Such an extraordinary list of indications shows the state of mind at which some obstetricians had arrived and can only be classified "indefensible."

Jellet (1927) declaring that there was no place for Caesarean section in the treatment of transverse presentation, cited a remarkable instance of the abuse of the operation. The practitioner concerned saw a patient one morning, one and a half hours after the membranes had ruptured. He found a transverse presentation but did nothing. In the evening, he found a hand and part of the umbilical cord in the cervix. A hypodermic injection of morphia was given. Next morning meconium was found to be coming away. Caesarean section was then performed. The patient, 24 years of age, had previously had two normal deliveries. The reason given for operation was that the uterus was in a state of tonic contraction, but as the child was found alive and well, this seems highly improbable. No attempt was made to see if the contraction, if present, would pass off under anaesthesia, nor to correct the presentation by internal version.

One is tempted to ask - was it only a coincidence that this article by Williams (1916) was followed immediately - in the same column on the same page of the same Journal - by one by F.S.Kellogg (1916) entitled "Caesarean section overdone."

The indications for the operation include presentation of the cord, habitual death of the foetus, tonic contraction of the uterus and hour glass contraction of the uterus. A rare case of the last mentioned was described by Sir Francis Champneys (quoted by Routh (1911)).

Passing from the numerous indications most of which may be classified under "Obstruction to labour", the next section calling for consideration is that of uterine haemorrhage.

Caesarean section for concealed accidental haemorrhage was first performed in 1891 by N.S.Bagot. He followed it up with hysterectomy and extra-peritoneal treatment of the uterine stump- in fact, a Porro operation. It was carried out in the patient's house. The mother made a good recovery although the child was lost. H. Briggs of Liverpool also performed the operation on this indication in 1893. She was considered too ill for hysterectomy and died on the third day, (Routh 1911). Pelvic fibroids and pyelonephritis were further complications in this case. J.H.Targett, (1905), described a further case, the mother recovering. "For the worst examples of concealed accidental haemorrhage, Caesarean section, followed by hysterectomy,



saves some patients who would almost certainly be lost by any other form of treatment." (Kerr 1937).

The employment of Caesarean section in placenta praevia has been the subject of so much dispute and discussion that a separate chapter will be devoted to it. The same applies to eclampsia.

In the miscellaneous group of constitutional conditions for which Caesarean section has been formed, mention may be made of cardiac disease (Grimsdale 1905), maniacal chorea (Blair Bell 1906), general anasarca involving especially the genital outlet (Lyle 1910), all quoted by Routh (1911), and myasthenia gravis (Gammel 1905).

The various conditions for which Caesarean section is performed in modern times can be judged from the following tables:-

	Munro Kerr (1937)	M'Ilroy (1932)	Haultain & others. (1933)	Greenhill (1931)	Lull (1933)
Total cases	256	182	436	140	573
	per cent	per cent	per cent	per cent	per c.
Contracted pelvis.	63	74	62.3	47	57
Breech (leg extended, very large child etc.)	3.5	3.3	1.3	-	1.2
Placenta praevia.	12	6	8.2	6	7.5
Pre-eclampsia	4	-	4.5	7	5
Eclampsia	1.2	(1 case)	0.4	1.7	2.4
Cardiac disease	7.4	7	9.4	4.3	3.6
Miscellaneous.	8.6	9.3	12.9	34	23.3.

The difference in the figures of British obstetricians, Munro Kerr, M'Ilroy, Haultain, and their American colleagues, Greenhill and Lull, is noteworthy. It would appear that the operation is frequently performed in America for conditions in which other measures would be employed in this country.

In judging the results to the mother and the child from Caesarean section, it was formerly the custom to consider the cases as a whole and state the mortality of particular operations as this or that percentage. Early in the present century Edward Reynolds (1901) drew attention to the high mortality attending the operation performed late in labour or in the presence of infection of the uterus. F.S. Newell (1904), considered uterine infection an absolute contra-indication to the operation, preferring craniotomy even if the child was alive, or hysterectomy if this was impossible. Reynolds repeated his views in 1907 and he was followed by Routh (1911). These writers were the first to point out that the maternal and foetal mortality depended chiefly upon the condition of the patient at the time of the operation - in other words the dangers of the operation in infected cases.

Routh (1911) went into the subject very fully and showed by his figures that cases operated on prior to or early in labour, and before any vaginal examination had been made, had a maternal mortality of between 2 and

3 per cent. and a foetal mortality of less than 1 per cent. while cases operated upon late in labour after many examinations and possibly attempts at delivery had a maternal mortality of between 20 and 30 per cent. His paper marked a new stage in the evolution of the operation of Caesarean section. The following table is of great interest showing as it does the mortality attending the operation, performed in cases of contracted pelvis, when performed in different stages of labour:-

Condition of patient.	No. of cases	Maternal deaths.	Percentage of deaths.
A. Not in labour	245)	9)	3.6)
	) 469	) 14	) 2.9
	)	)	)
B. In labour, membranes intact.	224)	5)	2.2)
C. In labour, membranes ruptured.	166)	18)	10.8)
	) 230	) 40	) 17.3
	)	)	)
D. Frequent examination or previous attempts at delivery.	64)	22)	34.3)

These facts received ample confirmation from subsequent writers, notably Munro Kerr (1916), who in a series of 110 Caesarean sections performed for contracted pelvis from 1901 to 1913, had a maternal mortality of 5.3 per cent. in noninfected cases while this figure

rose to 10 per cent in certainly infected and doubtfully infected cases. E. Holland (1921) in an investigation reported similar results which he tabulated thus:-

Condition of patient.	No. of cases	Maternal deaths.	Percentage of deaths.
1. Not in labour	1,289	18	1.4
2. Early "	384	7	1.8
3. Late "	213	20	9.4
4. After forceps or craniotomy.	102	27	26.5

It is of interest to compare these figures with those of Kayser given many years before (1844) (Chapter 3).

Routh's paper, read at the fifth international Congress of Obstetricians and Gynaecologists held at St. Petersburg in September 1910, aroused tremendous interest and gave rise to considerable discussion as to the best method of dealing with such cases as those in classes C. and D.

It is not intended to convey the impression that obstetricians had previously been blind to the danger of the operation in infected cases - far from it. The risk of the classical operation in such cases caused them to spend much time and thought in devising alternative procedures. Thus, for a time, the Porro operation held the field, although it was not originally employed for

septic cases only, but as a routine procedure. Its success in reducing the mortality from 88 to 55 per cent. was due firstly to the fact that there were many faults in the operation of Caesarean section as then performed, and secondly, to the fact that nearly all cases of contracted pelvis had already had many attempts made at delivery to avoid the enormous mortality attending Caesarean section.

The discussion at St. Petersburg (Routh 1911 a) showed how doubtful or even hopeless, and also how divergent were the views held by those present, as to the best method of dealing with such cases.

Professor Bumm (1911) of Berlin declared that "for feverish women with a septic genital canal, there is not yet found an absolutely secure method of Caesarean operation." He specified four conditions in which he thought craniotomy was preferable:-

- (1) That in the primipara where infection is undoubtedly present, craniotomy is the best and surest treatment, for, by it one life already compromised is lost; whereas, by all other methods, two lives would probably be sacrificed.
- (2) If the Amnion has been ruptured for some time, and there is only a slight elevation of temperature, classical Caesarean section is fatal.
- (3) In all cases of bacteria of any kind, we object

to the section and make the perforation of the child.

- (4) When bacteria are found in fever cases, we perforate the child.

Brandt of Christiania thought there was no operation suitable for these septic cases but performed supravaginal hysterectomy, followed by extra-peritoneal treatment of the stump, an opinion supported by Schanka.

Pestalogga of Rome, while preferring extra-peritoneal to classical Caesarean section in such cases, recommended embryotomy.

Routh himself said "Extra-peritoneal Caesarean section and all forms of pelviotomy are better avoided for septic cases, and as classical Caesarean section has a death rate of from 10.8 to 34.3 per cent., there remains, therefore, only craniotomy or some variety of Caesarean hysterectomy."

Jardine, Whitridge Williams and Singer were also quoted as regarding craniotomy as the operation of election in the presence of sepsis, when it could be performed, a view strongly opposed by Hasting Tweedy (1909) who considered perforation of a living child wholly unjustifiable and described it as one of the "obsolete barbarities of the past." He thought that the possibility of sepsis did not rule out the performance of extra-peritoneal Caesarean section.

Textbooks during the first decade of the present century also show the diversity of opinion on the

subject. Thus Eden (1908) recommended hysterectomy after Caesarean section, Galabin and Blacker (1910) advised the performance of the extra-peritoneal section. Munro Kerr (1908) wrote "In recent years I have made it a rule never to perform Caesarean section in cases which have been interfered with prior to their coming under my care unless the pelvic deformity is so extreme as to render craniotomy impossible or more dangerous to the mother. I am compelled, therefore, not infrequently to perforate a living child. This I do with extreme regret but I am convinced I save more mothers and probably indirectly more children by so doing. I do not take upon myself the blame of destroying children; that rests with those who send cases too late to hospital."

Reviewing the subject in 1916, the same writer said "So long as hysterectomy is the only alternative to craniotomy in such cases, it is very questionable if we choose wisely when we select the former operation. Do we really save mothers and children? We do not save more mothers, for the maternal mortality from hysterectomy and craniotomy in presumably infected cases is almost identical, and although we undoubtedly save at the time a few more children by choosing hysterectomy, we sterilise a number of young mothers upon whom, if craniotomy were performed in the first instance, Caesarean section might be done and repeated with every certainty of success should other pregnancies follow."

This view received general support both at home and



abroad and is still held to-day, although Bourne and Williams (1932) and <sup>after</sup> Armytage (1931), expressed the view that the lower segment operation has extended the field of abdominal delivery for women already in labour.

Various procedures have been devised from time to time to deal with infected cases, apart from hysterectomy. R.D. Maxwell (1910) suggested irrigation of the amniotic cavity, with normal saline solution, before operation, through a soft pewter or other pliable tube, passed up to the fundus uteri. Routh (1911) suggested boracic lotion instead but pointed out the difficulties associated with such a procedure if the liquor amnii had all drained away and the uterus had contracted down on the child. The almost impossibility of dislodging germs from the foetal apertures and irregularities was another disadvantage. If the infection was a virulent one, solutions strong enough to disinfect the uterine cavity would almost certainly cause injury to the child.

A. J. Wallace (1911) suggested stitching together the uterine and parietal peritoneum before opening the uterus and then passing a drainage tube through the abdominal wall into the uterus. He described two successful cases in the second of which he added another step to the operation by inoculating the edge of the wound with lactic acid bacilli.

Packing the uterus with iodoform gauze (Edge 1911), with gauze soaked in a strong solution of sod. hypochlorite (Blair Bell 1920), thorough disinfection of the genital canal

with such an antiseptic as "Blue paint" (Bannister 1921) or dettol are among the other measures suggested.

Efforts were also made to determine the presence and virulence of the infection, if present, by bacteriological examination of the liquor amnii or swabbing from the uterine mucosa or the cervix. Vaccines were tried but the results were not encouraging.

The recent developments in chemotherapy must prove helpful in such cases but the difficulty is one calling for prevention rather than cure - efficient ante-natal care with the assistance, to all practitioners, of expert advice in doubtful cases.

Another aspect of Caesarean section calling for notice is the question of the rupture of the uterine scar during a subsequent pregnancy or labour. Not all patients undergoing the operation required it to be repeated at the end of a subsequent pregnancy.

Most writers state that the first recorded case was that of Kolbank, reported by Hofmeirer (1905). His patient underwent Caesarean section at her fifth labour in 1887. Convalescence was febrile. During a sixth labour in 1891 the uterus ruptured. At operation the foetus and placenta with membranes intact were found lying free in the peritoneal cavity. The foetus was dead. The edges of the rent in the uterus were excised, the rent sutured and the patient made a good recovery. Von Winckel however reported a similar occurrence in 1860 (see page 214). Two further cases were reported by Guillaume (1896) and

Woyer (1897). In this country, Galabin and Targett reported cases in 1900 and Munro Kerr in 1904.

In America, Mabbot recorded the first case in 1906.

While collections of cases were published from time to time by such writers as Palmer Findley (1916) in America and E. Schneider (1916) in Germany, it was not until 1920 when Eardly Holland (1920) published an account of an investigation into the subject, that the danger was fully realised in this country.

Holland (1920) declared that half the minority who survived Caesarean section in "pre-Sanger" days, got a ruptured scar in the unfortunate event of a future pregnancy. Writers of the period, however, were almost silent on the subject. He showed that the frequency of rupture of the Caesarean section scar in the uterus was, in subsequent pregnancy or labour, excluding abortion, four per cent. The cause was imperfect healing of the uterine wound and the liability to rupture after suturing with catgut was found to be two and a half times as great as when silk was used. The scar of the transverse fundal incision was found especially liable to rupture.

The fact is accepted by obstetricians throughout the world that no matter what precautions are taken, and how carefully the wound in the uterus is stitched, there is always the risk of rupture in a subsequent pregnancy or labour if the classical incision has been employed.

Munro Kerr (1921) gave seven reasons why a scar in the active contractile portion of the uterus can never be

"full proof" against rupture:-

- (1) The uterine wound is very liable to be less or more infected.
- (2) Uterine muscle fibres during the puerperium are in a state of degeneration.
- (3) The alternate contractions and relaxations of the uterus during the first few days of the puerperium tend to disturb the sutures.
- (4) The fact that sutures must be haemostatic agents as well as co-aptors.
- (5) The irregular distribution of the sheets of muscle fibre, making exact co-aptation impossible.
- (6) If the placenta is situated on the anterior uterine wall, as it is in 40 per cent. of cases, exact co-aptation of the edges of the uterine wound is difficult.
- (7) If at subsequent pregnancy, the placenta is implanted over the scar, the destructive action of the chorionic villi on the fibrous tissue becomes pronounced and this predisposes to rupture.

The scope of Caesarean section has become enormously extended during the last thirty years. Up to a point this extension has been all to the benefit of parturient women but unfortunately, the operation, particularly the classical variety, so simple of performance, has been greatly abused. Perusal of the literature would appear to show that this has been particularly the case in U.S.A.

Some statistics given by H.Jellet in 1927 are worthy of quotation. In the Bellvue and Associated Hospitals in New York, out of 4,268 confinements, Caesarean section was performed once in every 97 cases. In the Boston Lying-in Hospital it was performed once in every 12 cases, while in the Jefferson Hospital, Philadelphia, the figure rose to the astonishing one of once in every 6.3 cases! H.S.Stander (1935) declared, that in some hospitals, the incidence of the operation was as high as 14.6 per cent. of all cases of parturition.

J.R.Miller (1928) declared that in the Hartford General Hospital, the incidence of the operation was 2.4 per cent. in 1916-17, rose to 6.1 per cent, in 1923-24, but fell to 4.3 per cent. in 1928-29. J.P.Greenhill (1930) stated that in the Chicago Lying-in Hospital it rose from 0.9 per cent. in 1916-17 to 3 per cent. in 1928-29, while E.D.Plass (1931) in a summary of 94,235 deliveries, in 119 U.S.Hospitals, gave the figure as 2.9 per cent.

By the way of contrast in Norway during 1917-18 only 0.15 per cent. of all confinements were completed by Caesarean section. In the Rotunda Hospital from 1888 to 1922, 54,412 women were delivered, the incidence of Caesarean section being but once in 366 cases.(Jellet 1927).

From Moscow, Ilkevich, Jelicky and Levez (1930) recorded 309,468 deliveries with but 743 Caesarean sections, an incidence of 0.24 per cent.

As in the case of any new operation, or rather in

this instance the resurrection, and improvement, of an old operation, it was received with great enthusiasm as a solution to many of the problems of difficult labour. Its supporters declared that destructive operations on living children for the sake of the mother should be considered as almost criminal, since there was now an easy method of saving the foetal life at very slight risk to the mother. The ease and safety with which it could be performed, if the ordinary rules of surgery were followed, tended to make it popular, both among the profession and among women. The short time taken for its performance, the absence of shock, of laceration and injuries to the mother's soft parts, no injury to the baby's head and no birth palsies, made a decided appeal to the physician; while the relief from the suffering of a long or dangerous labour appealed even more strongly to the mother.

Such an obstetrical millienium had not yet been reached however and many of the leading obstetricians issued words of warning to their colleagues.

As early as 1904, F.S.Newell gave a list of contraindications to the operation which included, uterine infection, exhaustion of the uterus or of the patient herself, prolonged labour, the presence of active disease and unsuitable surroundings. He also included placenta praevia and eclampsia on his list, except in very special circumstances.

R. W. Holmes (1915) in a forcible address, entitled "Obstetrics, a lost art" declared that Caesarean section was becoming a sort of makeshift for real obstetric practice. He considered such indications as face, brow, occipito-posterior and transverse presentations "absurd". He went on "those who are now advocating Caesarean section for placenta praevia, eclampsia and so forth must bear the responsibility for the deaths which may result from uterine rupture at a later time. In estimating mortality percentages, such deaths must be credited to the "primary" operation and not placed in a class by themselves." "Can anyone imagine a more unhappy plight than that of primiparous women who have been treated by a Caesarean section for eclampsia or a placenta praevia with a perfectly normal pelvis who are and should be perforce doomed in all their subsequent confinements to the same abdominal surgery?" He continued, "and yet it is not only the man whose training fits him for other fields of medicine who is forgetting the obstetrical principles but too often the obstetricians themselves have wildly seized upon Caesarean section as a ready and quick means of getting through with the case. How easy it is to spend some thirty minutes in performing Caesarean section and how hard it is to perform a Hick's version or perhaps introduce the bag, and then await time for the work to be completed, sitting up half the night perhaps."



He mentioned a case in which the operation was performed on a woman seven months pregnant and suffering from pyelitis. The defence of the operator was that the vulva was contaminated by colon bacilli which were the etiological factor of the kidney disease, she having a badly torn perineum. Holmes said that the "baby died promptly." In another, Caesarean section was performed on a woman who had been four days in labour; the head was so deep in the pelvis that symphyseotomy was required in order to withdraw it! Amongst others, were two performed for uterine inertia.

Addressing the Clinical Congress of Surgeons of North America in 1916, Whitridge Williams (1917) said "Unfortunately history shows that advances in the practice of medicine and surgery are rarely attained in a thoroughly rational manner, but that a period of undue enthusiasm, or even absurd reckless abuse, usually preceeds the establishment of the actual value of a given procedure.....I believe that we are at present going through such a stage in connection with Caesarean section."

Again in the fifth (1924) edition of his "Obstetrics", he wrote as follows:- "With the increasing perfection of surgical technique, and an erroneous idea of the safety of the operation, there seems to be a growing tendency to regard it as the simplest means of coping with most obstetrical difficulties. At the present time I consider the operation is being abused

and that not a few patients are sacrificed to the furor operativus of obstetricians and general surgeons who are ignorant of the fundamental principles of the obstetric art. This being the case, the conscientious obstetrician should be particularly careful in the recognition of the indications for Caesarean section."

Concerning the indications, he declared that in many parts of the country, the mere diagnosis of a contracted pelvis, irrespective of its degree, was considered a satisfactory indication for the operation. This, he said, showed a profound lack of obstetrical knowledge and ignorance of the fact that between 75 and 80 per cent. of all women with contracted pelvis delivered themselves spontaneously if given the opportunity to do so. In doubtful cases he advocated a "test labour." He considered the indication of a breech presentation in a primipara as "little short of scandalous" and Caesarean section for occipito-posterior positions, "preposterous." He asserted that the time had arrived "when a halt should be called upon the indiscriminate employment of the operation by many who are ignorant of the fundamental conception of the obstetric art."

F.S. Kellogg in 1916 asked "On what indication is it being advised in this community? The honest answer is - almost anything that keeps a baby from flopping into the world itself." He even went so far as to say that

"Caesarean section has perhaps been done in some rare instances for personal advertisement or commercial reasons on account of the poor fee for poor work that is often paid for ordinary deliveries."

G. M. Boyd, also in 1916, wrote on very similar lines. "Is it justifiable in the operator" he asked, "to offer as his excuse, that he was more familiar with section than with version or craniotomy? How often we hear the statement by the surgeon "I have not delivered a woman for 20 years." "Is it possible for one so rusty in midwifery to solve accurately the problem of when to operate and when not to do so? Is it surprising that the student who frequently sees the operation performed has it constantly in mind as the treatment for innumerable obstetric complications?"

More recently, K. M. Wilson (1937) and F. W. Lynch (1937) wrote in a similar strain. The former believed that abuse of Caesarean section was brought about in one or more of three ways:-

- (1) Extreme laxity in recognition of the proper indications for the operation.
- (2) Failure to perform the operation at the proper time.
- (3) Poor judgement in the selection of the proper type of Caesarean section when the operation is indicated.

From available reports, he estimated the gross operative mortality to be between 10 and 12 per cent.

Lynch too stated that the maternal mortality for Caesarean section in the United States was unduly high. Although the incidence of the operation was increasing, yet it had not lowered the maternal mortality. He went so far as to declare that the American College of Surgeons should restate the indications for Caesarean section and instruct hospitals certified by its board to permit the operation only after consultation with one of the chief obstetricians to its senior staff. Such a remarkable suggestion brought forth a strong protest from de Lee who observed that similar rules might be applied to the operation of gastro-enterostomy.

Let it not be thought, however, that American surgeons are the only sinners! In 1921, Munro Kerr and after him, G. Blacker, spoke of the abuse of the operation although perhaps not in quite such strong terms as Holmes. The former stated that he felt it "necessary to utter a word of caution regarding the danger of extending it unduly and rashly. In certain conditions, such as pelvic deformity, fibromyomata obstructing the parturient canal, there is no doubt that Caesarean section is indicated; in others however, it is not absolutely indicated, and in dealing with them, discretion must be exercised and the cases selected with discrimination."

While remarking on the good results in suitable cases in suitable surroundings, G. Blacker (1921) believed that there was "a great and increasing danger of its being performed on unsuitable cases and in unsuitable

surroundings on the expectation of obtaining equally good results." He declared that many practitioners were resorting to the operation for the flimsiest reasons under the impression that it was the safest procedure for both mother and child - an erroneous idea. "What are we to think" he asked, "when we find cases recorded on the literature in which the indications for the operation are given as uterine inertia, epilepsy, hydramnios, varicose veins and abdominal pain? We can only conclude that the operative zeal of the practitioner has outstripped both his knowledge and his judgement." "The time has certainly come when it is worth while to examine critically the varying conditions in which many practitioners are resorting to the performance of Caesarean section as a means of dealing with certain obstetric difficulties."

Henry Jellet in 1927, wrote in a similar strain. He pleaded for "a reversion to the older and saner ideas that used to govern midwifery practice generally and that still govern it in most places." "If Truth lies in front of us, it is well to go forward but if we have overshot her and she is behind us, it is necessary to turn back. Discretion is the better part of midwifery."

In 1928, M. Hirsch, a German surgeon, urged more frequent use of abdominal delivery in a remarkable article which included the following - "The mother's

chance<sup>s</sup> in delivery by Caesarean section are to-day better than competing methods of vaginal delivery." Such a statement precipitated many adverse opinions and, needless to add, received but little support. It was attacked by his own countrymen, notably G. Winter, E. Essen-Møller and C. J. Gauss. *A. F. Winter*

Winter (1929) arguing against such radicalism used certain collected German statistics for 1928 and reviewed 4,450 abdominal deliveries with a total mortality of 7.1 per cent. and a mortality due to the operation itself of 4.2 per cent.

Essen-Møller (1928) also took a strong stand against such a view saying "No; surgical intervention is not intended to shorten a physiological process nor merely to alleviate it. It is permissible only after a thorough consideration of the pros and cons."

Gauss (1929) especially decried abdominal delivery for foetal conditions and included in this, eclampsia and placenta praevia where, in his opinion, equally good results for the mother could be obtained by delivery from below but where Caesarean section admittedly reduces the foetal death rate.

The great increase in the number of Caesarean sections performed was not accompanied by a fall in the mortality rate either foetal or maternal; on the contrary it was increased. E. D. Plass (1931), said that "the increased use of Caesarean section is merely part of the modern operative furor but, from the standpoint of

maternal mortality, the most important, since by conservative estimate the death rate is between 5 and 10 percent." A similar mortality rate for all cases of Caesarean section was announced by Williams.

Even with an actual incidence of 1 per cent. in U.S.A. as a whole, 25,000 operations of Caesarean section were estimated by Plass to be performed annually. He believed that three-fourths of these were unnecessary entailing a death list of 900 to 1,800 per annum. He concluded "there is little hope that the natural operative furor will wear itself out quickly but it may be that wide <sup>dissemination</sup> discrimination of the general principles underlying the relatively safe performance of obstetric operation can effect some improvement."

Has this operative furor worn itself out?  
Perusal of recent indications for the operation leaves grave room for doubt.



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Chapter VII.Caesarean section in cases of Placenta Praevia.

It has already been described how, consequent upon the improved results of Caesarean section which followed the new technique, the indications for the operation became extended. That which gave rise to greatest controversy was the suggestion that it should be employed in cases of placenta praevia.

The first to suggest this was Lawson Tait (1890) of Birmingham in an address given by him in 1890, entitled "The Surgical Treatment of impacted Labour." After reviewing the terrific mortality resulting from haemorrhage and infection in cases of placenta praevia, he remarked, "If I had to deal with a case of placenta praevia from the beginning of labour, and could carry out what I believe would be the ideal surgical treatment of this condition, I should amputate the pregnant uterus. I should thereby save the child with certainty. I should relieve the mother with perfect safety from death by haemorrhage; and by removing all the tissues in which large suppurating sinuses were present, I believe I should relieve her with almost equal certainty from the secondary risks."

It is no exaggeration to say that Lawson Tait's paper was a bombshell in the obstetric camp, for at that time, obstetrics was considered more as a branch of medicine than of surgery, and was controlled by the physicians, Furthermore, as has been previously

stated, Tait seldom attended obstetric cases, although, as is well known, he carried out a tremendous number of gynecological operations. Practically no notice was taken of his suggestion and it was not until 1898, that he put his suggestion into practice.

On December 21st, 1898, he was called to see a multipara suffering from placenta praevia. The cervix was found closed and rigid, the liquor completely drained away. Severe haemorrhage had occurred in spite of "many and other orthodox treatments". He carried out a Tait-Porro operation, already described, and the mother made a good recovery. The child was born alive but succumbed at the age of one month to bronchitis.

Commenting on this story, Tait (1899) said, "This case forms as far as I know, a new departure. Whether it will receive a universal commendation is not the least a matter of doubt. The mutilationists will raise their voices against my proposal but there are others who will follow my example and to those who do this, will surely come the comfort that they will diminish the anxiety to the practitioner and the real danger to the patient of this obstetric difficulty, which Simpson so graphically tells us has more of both than any other."

Prior to Tait's successful case, Caesarean section had been performed for placenta praevia three times in the United States. It had been suggested by Hutson Ford in 1892. On purely scientific grounds, he arrived at the

definite conclusion that Caesarean section was not only justifiable but, in reality, definitely indicated in complete and central ectopic implantation of the placenta. Drs. Hypes and Hulbert were the first to perform such an operation but no details of it, not even the date are known, except that it was carried out "under very unfortunate circumstances" (probably after everything else had been tried) and both mother and child were lost. (Bernays 1894)

In 1892, J. M. Sligh reported a case of placenta praevia with a rigid cervix, probably malignant, in which he performed Caesarean section after efforts to deliver with tampons, forcible dilatation of the cervix, Barnes' bags and bimanual version, had all failed. Not surprisingly, the patient was, at the time of operation, in a state of great exhaustion, due to severe haemorrhage and the many manipulations. She died twelve hours after its performance. Sligh was fiercely attacked by J. Rosenberg (1892) for his efforts, but made a very able reply, Sligh (1892a) pointing out that he could have pursued no other line of treatment.

In 1893, the first successful conservative Caesarean section for placenta praevia was performed by an American surgeon, A.C. Bernays (1894). The patient was a multipara, 42 years of age, pregnant about eight months. Prior to operation, she had had severe haemorrhage for about twelve hours, which was treated by tampons and elevation of the hips, with the patient in the recumbent

position. Caesarean section was then carried out; twelve deep silk sutures and four superficial ones were inserted into the uterine wound. Unfortunately the child lived but ten hours, dying from congenital heart disease. In his commentary, Bernays expressed the opinion that "if an expert operator can be had who has done or assisted at, more than two hundred abdominal sections of all kinds, in which the mortality was less than  $7\frac{1}{2}$  per cent, by all means let him do Caesarean section. If no such surgeon is at hand, select a physician to deliver the child who has frequently turned and extracted, one who knows how to clean his hands and who knows that it is a very difficult and tedious task to properly shave and cleanse the vulva and vagina."

Little more was heard about the matter until 1901 when, following the report of four further cases from the United States, the controversy sprang to life again.

Donoghue (1900), Hare (1900), Covington (1901) and Gillette (1901) each reported a case. Three of the mothers lived although all were in a poor condition at the time of operation; the one who died might have been saved had she given her consent to the operation sooner, this being at first refused. All four children were born alive.

The chief supporters of the operation in placenta praevia in American circles were A. P. Dudley, G. M. Boyd and E. G. Zinke. Dudley (1900) considered it an ideal



method of treatment, but only if the pregnancy was so far advanced that the child was likely to live and believed that the patient ran much less risk of infection by Caesarean section than by manipulation from below. Boyd (1901) expressed the view that a lower foetal mortality would result and believed that the operation would be an effective method of controlling haemorrhage. He added, however, that Caesarean section was indicated only if the child was viable, the placenta completely or partially covering the internal os, the cervix rigid, or the foetus presented by the shoulder.

E. G. Zinke (1901) opened a discussion on the subject at a meeting of the Association of American Gynecologists and Obstetricians in September 1901. He mentioned the eight cases already described and, while admitting the number was small, drew attention to the low foetal mortality - 25 per cent. as against the usual 50 to 80 per cent. He spoke strongly in favour of the procedure saying, "Many of you will see the day when not only teachers of obstetrics, but the general practitioner, when confronted with a case of placenta praevia, will earnestly consider the proposal of performing Caesarean section instead of a forcible dilatation, version and extraction and if one is not able to do a Caesarean section himself, he will look around and say, whom can I get to do this for me?" He added a word of caution however. "To advocate

Caesarean section in all cases of placenta praevia would be a greivous error. That the operation has its place in the management of these cases, should be accepted by all. He continued "I firmly believe that the Caesarean section is a perfectly legitimate and elective operation in all cases of placenta praevia, central and complete, and especially so where the patient is a primipara, where the os is closed and the cervix rigid, where haemorrhage is profuse and cannot be controlled by tampons, and when separation of the placenta around the internal os is difficult or impossible. That there are cases of partial praevia that may be successfully treated in the old way, I do not doubt. Perhaps a small minority of all the cases of placenta praevia can be successfully treated by the method of Fry and Lee. But what of the large majority of mothers that succumb and the great majority of children that are sacrificed at once?"

Zinke's paper aroused a storm of criticism and few of those present were in favour of his suggestion. The great majority of obstetricians were strongly opposed to it. Thus C. A. L. Reed (1901) declared that operators who advocated this step were surgeons who had little or no experience in obstetric practice.

R. A. Murray (1902) gave his view that the operation was only justifiable in placenta praevia where a history of previous difficult labours and deformity of the pelvis would render it impossible to deliver the

patient, per vias naturales, rapidly. He considered it unjustifiable in "ordinary" cases of placenta praevia and absolutely contra-indicated where there had been severe bleeding and where frequent examination and manipulation had, in all probability, infected the patient.

Whitridge Williams (1902) protested against the performance of Caesarean section in placenta praevia except in a primipara with a long rigid cervix, a condition, in his opinion, very rare.

R. W. Holmes (1905), too, uttered words of warning in 1904, saying - "for most certainly, American and Italian physicans, who alone are treating this obstetric complication by laporotomy, will regret their advocacy of the procedure when the reaction comes." While admitting that a reduction in foetal mortality might be obtained, he believed that the maternal mortality might be greatly increased. In support of this statement he mentioned 25 cases of placenta praevia treated by Caesarean section (8 Porro operations and 17 conservative) with a maternal mortality of 20 per cent. and a foetal of 36 per cent. In a series of 2,756 cases, since 1877, treated by obstetric methods, the maternal mortality was but 7.36 per cent. and the foetal 54.1 per cent.

In Great Britain, the suggestion received little attention and still less support, most obstetricians dismissing it with scorn. Thus at a meeting of the

British Medical Association in 1902, Munro Kerr (1902) in discussing the indications for Caesarean section, declared that those who found such an indication in placenta praevia, did so because they were "ignorant of proper obstetric methods", while Cameron said, "A skilful obstetrician would never think of such a procedure in the case of placenta praevia. In fact, the operators who advocate such a step, are surgeons with little or no experience in obstetric practice", a view which he repeated in 1906.

The operation for such an indication was rarely performed in this country and in A.Routh's (1911) large collection of Caesarean sections performed up to 1910 by living British obstetricians, placenta praevia was given as the indication for operation in but seven.

The first of these was performed in St.Mary's Hospital, Manchester, in 1897, but the woman was moribund on admission and the operation was more of a last minute effort to save the child, in fact almost a post-mortem Caesarean section. In the remaining six cases, the mother recovered and four of the children were saved, the surgeons being W.S.A.Griffiths (1909) H. Williamson (1908), Munro Kerr,(1909), D.C.Rayner (1909), W. J. Gow (1910) and N. Starke (1910). Those of Williamson, Rayner and Starke were mentioned by Routh (1911); the others had previously been reported.

The general opinion of British practitioners at this time was that, in the routine treatment of

placenta praevia, there was no place for Caesarean section, but that it was indicated in cases of central placenta praevia associated with a rigid and undilatable cervix and where bipolar version, as first suggested by Braxton Hicks, was impossible. Such conditions were rare and did not occur in more than 5 per cent of cases of placenta praevia. This was the view put forward by Jellet in 1910 and it received the support of such eminent obstetricians as Champneys, Spencer, Purslow, Griffin, <sup>2.11.50</sup> Gow and Routh. Jellet also pointed out that the haemorrhage in placenta praevia, especially the central variety, usually commenced before foetal viability could be assured, and that even if the child did survive Caesarean section, it was usually puny and under-developed. Herman (1910) held similar views.

On the continent of Europe, most obstetricians did not favour the operation any more than their British colleagues. Thus such writers as Baisch, Veit, Zimmerman and Hammerschlag expressed disapproval. Neu (1909) of the Heidelberg Clinic favoured it only if the child was capable of survival and the mother not infected, or in cases of central placenta praevia. Kronig (1910) and Sellheim, in 1910, described a remarkable series of 26 cases of placenta praevia treated by Caesarean section, from which all the mothers recovered and all the children were born alive. British practitioners were, however, inclined to

discount these figures and to regard the cases as "picked".

Pankow (1909), quoted by Harrison (1909), was one of those who wrote in favour of the operation, in view of the improved prospects for the child. He quoted Zweifel, who declared that, in the interests of the child, it was logical, in appropriate cases, to perform Caesarean section. He further pointed out that abdominal section rendered possible a view of the domain of the implantation of the placenta and the exact source of the haemorrhage.

Nevertheless, as time went on, professional opinion slowly changed. After Zinke, Ross McPherson (1913) took up the crusade in America. In 1907, he read a paper at the annual meeting of the American Medical Association, advocating Caesarean section in a limited number of cases. His reception was no better than that accorded to Zinke some years earlier. Some of the speakers who took part in the discussion intimated that such views savoured either of inexperienced youth or rabid enthusiasm, and nearly all were agreed that the operation was quite unjustifiable and unnecessary.

McPherson, however, "stuck to his guns", and the same meeting the following year, again raised the subject, receiving some slight approval or at least less opposition. Five years later, he repeated his views and it was agreed that, in certain cases, the operation was justifiable.

Two of the most violent opponents of the

operation in placenta praevia were Charles Jewett (1909), who contended that obstetric measures gave better results, and Schwarz (1812), who formulated the conclusion, in 1912, that "no form of placenta praevia as such ever offers a justifiable indication for Caesarean section."

McPherson was of a very different opinion, and at the 1913 meeting of the American Medical Association, said, "We believe that the indication is clear, that when we encounter a primipara with a placenta praevia, either marginal or central, or a multipara with a central placenta praevia, in either case where the cervix is rigid or undilatable, whether there is or is not pelvic disproportion, provided the child is viable and the mother offers the ordinary safe operative risks, that Caesarean section holds out a better chance of saving the lives of both mother and child, with fewer complications than any other method of delivery, always provided that the operation is performed by a competent and experienced operator and amid suitable surroundings." He rightly stressed these points, because the operation had frequently been undertaken, as it had been many years before, as a last resort, after all other attempts at delivery had failed. Such patients were almost certainly bound to be infected, and this together with the heavy loss of blood which many of them had sustained before operation, made them poor operative risks, and liable to bring discredit, both on the operation and on



the surgeon performing it.

McPherson's paper was the first on this subject to receive any support worthy of consideration and from the date of its appearance, Caesarean section came, in the United States, to have a definite place in the treatment of placenta praevia.

In Great Britain, the change of opinion was also slow. We have already seen the opinion expressed at a meeting of the Royal Society of Medicine in 1910. Ten years later, the subject was again discussed at a meeting of that body and distinct change of opinion was evident. Most of the speakers, all practising obstetricians and representing the chief teaching centres in the country, instead of condemning Caesarean section for placenta praevia, considered that it occupied a definite place in its treatment and some were wholeheartedly in favour of it as a routine method of treatment. (H. Tweedy 1920-21).

An excellent idea of the "swing-over" may be gathered from the writings of an eminent obstetrician who was in practice when the operation for placenta praevia was first proposed - Professor J.M.Munro Kerr.

We have already seen his opinion in 1902. Six years later, in 1908, he wrote, "I have never performed Caesarean section for placenta praevia, and, it may be I never shall, but I am less antagonistic to it than I was, and I would not now condemn, as I was once inclined to do, those who would have recourse to the

operation under the circumstances indicated."

The cases to which he referred were "old primipara" where the haemorrhage occurs at full time and before labour has started, and where, to judge by the condition of the parturient canal and the size of the canal, delivery would be tedious and difficult."

By 1916, he tells us that he had performed the operation on three occasions for placenta praevia, saving both mother and child on each occasion, and also described two others which came under his care and where Caesarean section would have been the best line of treatment.

Writing again on the same subject in 1921, Professor Munro Kerr said, "It appears to me, therefore, that this complication is particularly suitable for Caesarean section and it may come to be the general method of treatment in all cases of central and marginal varieties." "At the present time, I am quite convinced that Caesarean section should always be selected in the case of a primipara with a central placenta praevia."

Today, no obstetric surgeon will dispute a place for Caesarean section in the treatment of placenta praevia.

In 1921, Holland, described a series of cases with the following results:-

see over page.

	No. of cases.	Maternal mortality.
Complete & central placenta praevia.	78	14 per cent.
Incomplete p.p.	43	9.3 per cent.
Degree not stated.	18	5.5 per cent. one death.

The foetal mortality for the whole series was 7 per cent.

*Handy up to 1/2*

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Chapter VlllCaesarean Section in Cases of  
Eclampsia.

Lauverjat, (1788) appears to have been the first to suggest the employment of Caesarean section in the treatment of eclampsia. In his book on Caesarean section, he discussed the use of the operation in cases of convulsions and advised that rapid delivery was required - an opinion expressed by Mauriceau many years before. He described several cases of convulsions occurring during pregnancy or during labour and asserted that, if Caesarean section was to be performed at all, it should be done while the woman was still alive, as he believed that, in such cases, the child died before the mother. He reported performing the operation post-mortem four times in 1780 on pregnant women with convulsions but in every case, the child was found dead.

Van der Akker is usually given the credit of being the first to perform Caesarean section in a case of eclampsia which he did, according to Pollak (1904) in 1875. This was repeated by many writers both at the end of last century and the beginning of the present but the writer of this history would like to put forward a claim for a much earlier operation - namely 1827.

On the 23rd April 1827, J. L. Richmond (1830), of Newton, Ohio, was called to see a patient who was being

attended in a log cabin in the backwoods by two midwives. She was found to have been having convulsions for many hours. According to the account of the case, no os uteri could be felt as the anterior wall of the vagina appeared to cover the cervix and form an acute angle with the posterior wall in the hollow of the sacrum. After attempting for hours to check the convulsions and to ascertain the presentation of the child, Dr. Richmond, without assistance, and using only the instruments in his pocket case, proceeded to perform Caesarean section cutting through the placenta in doing so. Great difficulty was experienced in extracting the child so he made a second, transverse, incision on the uterus. The woman made a good recovery and is stated to have resumed her household duties within three weeks.

It seems reasonable to assume that this was a case of eclampsia. The speedy recovery after delivery is noteworthy and there is no mention of convulsions after operation. R. P. Harris in his collection of cases (1878) also mentions an operation performed by Foster in 1870 on a patient suffering from eclampsia. The child was saved but the mother died a few days later.

Van der Akker's patient was a primipara at full time. She also had a contracted pelvis. She had several attacks of convulsions before operation but none after and made a good recovery. The child too, was saved.



The credit of developing and furthering the use of Caesarean section in eclampsia must go to Dutch surgeons, even although the cases of Richmond and Foster are admitted, and in particular, to Halbertsma (1889). His first case occurred on July 1st 1878. The patient, 26 years of age, was having repeated convulsions, between which she did not recover consciousness, and which were only controlled by the use of chloroform and morphia. There were no signs of labour, the patient's pulse rate was increasing and foetal heart sounds were poor. Caesarean section was performed and profuse haemorrhage ensued due to the placenta being cut through and failure of the uterus to contract properly. She died two days later although the child was saved. He reported two further cases both occurring in 1888. Neither were in labour and operation was undertaken when conservative treatment proved of no avail. Both mothers recovered although the child of the first died on the tenth day.

Halbertsma reiterated his suggestion at the twelfth international medical congress held at Berlin in 1890 and announced the operation had been done in six cases of eclampsia in Holland, saving five mothers and five children. He declared that the convulsions ceased or were at least reduced after operation. An American commentator (1890) remarked that the "verdict on this active mode of treatment will vary."

German surgeons then took up the suggestion and

during the last few years of the nineteenth century, several series of cases were reported.

Kettlitz (1894) reported 28 cases with a 50 per cent. maternal mortality. He formulated three conclusions:-

- (1) Caesarean section for eclampsia is attended with a high mortality but this is due more to the gravity of the cases than to the operation itself.
- (2) The effect on eclampsia of delivery by Caesarean section is the same as other operative interference.
- (3) There are rare cases of eclampsia in which delivery per vias naturales is impossible without sacrificing the child.

On these grounds he expressed the view that Caesarean section was indicated in desperate cases as rapid delivery usually resulted in an improvement in the condition of the mother.

Hillman (1899) mentioned 40 cases in which 21 mothers and 18 out of 41 children were lost. He advised the operation only if medical measures failed to effect an improvement. In 7 of his cases convulsions were observed after operation - in the remainder they ceased.

Olshausen reported in 1900, that out of his last 250 cases of eclampsia, he performed Caesarean section on but three occasions, saving two mothers and three children. Fits ceased in all after operation and he

advised its performance in severe cases with a rapid succession of fits where labour had not commenced.

The matter was also considered at the International Congress at Geneva in 1896 but the general opinion was that Caesarean section should not be regarded as ordinary and routine treatment of eclampsia and that it was justified only when every other kind of treatment had failed. (Croom 1903/4).

The next Caesarean section for eclampsia in America took place in July 1890, although not reported for some years, (Wyrer and Ayres 1896). The patient was a primipara, pregnant 8 months. Labour was obstructed by a fibro-cystic tumour and there was much delay in operating. She died. Another was reported by Ill in 1901, the patient having a "very long and closed cervix." Ill remarked that "early cases of uraemic convulsions with a tightly closed cervix, especially primipara, afford a better chance by Caesarean section than other means."

In Great Britain, A. E. Morris described, in 1902, a Caesarean section performed in a case of eclampsia from which the mother recovered. She was in the sixth month of pregnancy. The procedure was discussed at a meeting of the Obstetrical Society of Edinburgh but prevailing opinion was against it. Such speakers as Haig Ferguson, and Fordyce, preferring artificial dilatation of the cervix with a Boss's

dilator.

At the meeting of the same Society the following year Sir Halliday Croom (1903/4) described two fatal cases, one in 1899 and one in 1900. The first patient was in a state of coma with frequent severe eclamptic fits, a hypertrophied cervix which it was not found possible to dilate, and a generally contracted pelvis. The Porro operation was performed. The second case was similar. In spite of failure, Croom came to the conclusion that in cases such as he had described, severe and frequent fits accompanied by a thick undilatable cervix, the simplest and easiest method of treatment was Caesarean section. "Under such circumstances, no symptomatic or expectant treatment would save the child, whilst we would not have the least guarantee of preservation of the mother and finally in most cases we should regret the loss of both. Under such circumstances Caesarean section, among all forms of operative interference to be considered, would certainly always offer the best prospect of the preservation of both mother and child."

Both Croom's cases were in a state where the operation became more of a last despairing effort than an operation of election. It is stated that in the second, it was important to save the child for reasons of succession, which purpose was accomplished, although the mother died from pneumonia three days after the operation.

British obstetricians were, on the whole, against the employment of Caesarean section in eclampsia. Comyns Berkeley (1904) sent out 110 letters to obstetricians in the United Kingdom inviting them to express their views with regard to the treatment of eclampsia. There was a remarkable divergence of opinion on various points relating to the condition itself, but the majority considered Caesarean section unjustifiable. Herman and Spencer spoke strongly against it. The operation was not, therefore, frequently performed in such cases and Routh (1911) in his paper mentioned but seven cases of which six died.

F. J. McCann was one of the few who favoured the operation under certain circumstances and in 1910 reported a successful operation which he claimed, wrongly, to be the first successful in the United Kingdom. In addition to the success recorded by Morris, W. J. Gow (1907) also performed a successful operation for eclampsia in 1904.

McCann's patient was a primipara, 7 months pregnant. The case was a severe one and efforts to dilate the cervix failed - "indeed I have never encountered such a degree of rigidity." The child was lost. He expressed the view that there was a distinct place for abdominal Caesarean section where the fits were severe and rapidly recurring, the patient not in labour and the cervix undilatable; or when the

mother was moribund and the foetus living, or where delivery per vias naturales was, for some reason, impracticable.

Up to this time the mortality, both foetal and maternal, attending Caesarean section when performed in eclampsia, was high but many of the operations were performed as a last resort and McCann rightly remarked "But was it not the same when this operation was first considered as an alternative to embryulcia in pelvic contraction and when it was only adopted as a last resort when other methods of delivery had failed?"

This point had previously been brought forward in Germany by Strickensein (1903) in a series of 26 cases with 8 deaths. He favoured Caesarean section as less likely to cause disturbance to the patient but pointed out that if it was only tried after other methods of treatment had failed, much of its value was lost. Prolonged attempts at delivery, he declared, made the mother's condition worse and diminished her chances of recovery. In his paper, he mentioned varying degrees of maternal mortality described by other German obstetricians varying from 44 per cent. (Löhlein) to 77 per cent. (von Fenkel).

R. Peterson (1914) collected a series of 500 cases up to 1913, 276 from U.S.A., 125 from Germany, and the remainder from other sources. He was at pains to point out, however, that such figures did

not necessarily indicate that the operation was performed so much more frequently in U.S.A., than elsewhere. He added that his requests for unpublished cases were more generally acceded to in his own country. He gave the mortality prior to 1908 as 47.97 per cent., and from 1908 to 1913 as 25.79 per cent. It is noteworthy that in these cases where the operation was performed after 5 or fewer fits, where vaginal examinations had been performed on only two occasions, or less, or where no attempt had been made to deliver from below, the mortality rate was but 15 per cent.

In 1921, the Royal Society of Medicine appointed a Committee to report upon "The Prognosis and Treatment of Eclampsia." Their investigations showed that in mild cases Caesarean section increased the maternal risk to the extent of nearly two to one, as compared with simpler methods (natural or assisted delivery and induction of labour). In severe cases, the results of Caesarean section were less encouraging. The Committee found, however, that Caesarean section yielded the best results from the point of view of foetal mortality.

While some writers such as Lapthorn Smith, (1917) Genge (1920) and Emerson (1920) wrote strongly in favour of Caesarean section for eclampsia, there were more who were critical about its value. Whitridge Williams (1921) in a series of 183 Caesarean sections upon 145 women performed the operation nine times for



eclampsia but was not impressed.

Ross McPherson (1918), who was once a strong believer in the procedure recanted and stated "that abdominal Caesarean section has absolutely no place in the treatment of convulsive toxæmia of pregnancy" except there co-existed pelvic disproportion. Bar (1919) described the results as deplorable while Harrar (1918) declared that "a man who employs Caesarean section in the treatment of toxæmia or the pre-eclamptic stage with good results is a better surgeon than he is an obstetrician."

Opinion regarding the propriety of performing Caesarean section in eclampsia has been divided since its first inception and still is today. Some writers advocate it in serious cases, but the majority prefer to rely on the sedative and eliminative methods of Stroganoff. It is not a common operation today; out of 1,587 cases of Caesarean section by British and American surgeons, mentioned by Munro Kerr (1937) eclampsia was the indication in but 21. From 1924 to 1936, Caesarean section was performed for eclampsia but once in the Queen Charlotte's Hospital, London. L. Phillips (1942), making this observation, strongly condemns such a procedure but favours it for pre-eclamptic toxæmia with severe and obstructive oedema of the vulva. This appears to be the view generally held today.

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Chapter LXCervical or Lower Segment Caesarean Section.First Attempts.

Brief reference has already been made in previous chapters to those forms of Caesarean section which may collectively be termed cervical Caesarean section, including therein the extra-peritoneal and lower uterine segment operations. The history and development of these operations, while of not such great antiquity as the "classical" operation, is no less interesting.

The first to suggest that the uterine incision might be made in the lower part of the uterus was Robert Wallace Johnson of London, a pupil of Smellie and a friend of the Hunters. His "New System of Midwifery" was first published in 1769 and a second edition appeared 10 years later. It was in the latter that he made his suggestion. He referred to two cases of rupture of the uterus during labour. The first of these was under the care of his friend Dr. Andrew Douglas. The rupture took place transversely low down in the uterus - "on the lower and fore part" - and was accompanied by but slight haemorrhage. Delivery per vias naturales was effected and the woman recovered. The second case was reported by Alexander Hamilton (1784). Here the rupture occurred "at the superior lateral part of the cervix; and the rent continued downwards to the very edge of the os tincae." He further declared that

the rupture was "amazingly diminished by the contractions of the uterus soon after the extraction of the child."

On the strength of these observations, Johnson said "I would have the incision made through the uterus transversely on its anterior side, as near the cervix as not to injure the bladder, avoiding as much as possible the larger branches of the hypogastric arteries; and this aperture being made of sufficient largeness to pass the end of a male catheter through a puncture made in the membranes, to draw off the liquor amnii etc., so that an effusion, thereof may not gush into the general cavity of the abdomen."

No more was heard of Johnson's proposition, there being no evidence to suggest that it was ever put into practice until Kehrer did so, almost a century later. Its fate reminds one of Lauverjat's suggestion that the uterine wound should be sutured. Had any surgeon had the courage to put into practice these two innovations, the story of Caesarean section during the years prior to the advent of the Porro and Sanger operations, might have been very different. But it was not to be.

It is a curious fact that almost all histories of the lower segment operations omit to give credit to Johnson for this suggestion, the only one to refer to it being R.P.Harris of Philadelphia, whose writings on the subject are of great merit. To a

British surgeon, therefore, must go the great honour of being the first to suggest that the uterine incision should be made transversely low down in the uterus although, as has already been stated, Kehrer was the first actually to perform it.

The subsequent history of the operation may be divided into two parts (after Garrigues 1878).

- (1) The age of projects and attempts in which we find Oslander, Joerg, Ritgen, Physick, L. A. Baudelocque, and Sir Charles Bell.
- (2) The age of fulfillment, commencing with T. G. Thomas and A. J. C. Skene, and continued, after an interval of about thirty years, by Frank, Sellheim, Doderlein, Latzko, and others.

Before going further, a word may be said about the nature of these operations, for the above named authors and surgeons have by no means all advocated or tried the same procedure; but there was something common in their aims which makes a unit of the different plans and attempts. All tried to avoid opening the body of the uterus as done in the "classical" Caesarean section; some opened the peritoneal cavity, others not; some incised the vagina, others the neck of the womb, or both together.

It is scarcely necessary to repeat how often death followed Caesarean section in its earliest days, most frequently due to haemorrhage or peritonitis.

The technique of laparotomy was poor, anaesthetics and antiseptics were unknown, and the bowels and omentum frequently escaped through the wound.

Further, before recounting the deeds of the surgeons first mentioned in the "ages of projects and attempts", it is as well to remind the reader that the knowledge of the anatomy of uterus and cervix possessed by them was not as good as it is today and that the distinction between vagina, cervix, lower uterine segment and body of the uterus was not as carefully drawn as in modern times. Since almost all the operations were performed late in labour when the cervix and lower uterine segment were one canal and dilated and stretched to the utmost, it is reasonable to conclude that their incisions were made as often in the cervix as in the vagina and most often in the lower uterine segment. This fact was appreciated by Oslander whose writings and endeavours call for first examination and study.

Frederich Benjamin Oslander, (1759-1822), who was Professor of Midwifery at Göttingen and the author of numerous works on obstetrics, recommended the following plan to be adopted in cases, where, with the vertex presenting, Caesarean section was the method of treatment decided on:-

By means of a hand introduced per vaginam, the foetal head was seized and pressed towards the anterior abdominal wall. The external projection



determined the site of the incision. With the other hand, the surgeon divided the integuments to the extent of four inches, not longer, so that the incision might correspond with the lower half of the uterus which was then divided. The foetal head was then pushed through the opening in the womb and after it, the rest of the child.

He thought that uterine wounds made in this manner would be shorter than by the old method and that, after the escape of the head, the body would be pushed forwards by the contraction of the uterus, by which means he would avoid the danger of the head being retained by the contracting power of the womb as had sometimes happened when the body of the child was first removed. He expected further that the low situation of the uterine wound would, on contraction of the uterus, in part at least, tend to prevent prolapse of the intestines and also afford a better exit to the discharge of the lochia per vaginam. He believed too that there would be less risk of rupture of the uterus should a subsequent pregnancy occur.

Osiander first put his ideas into practice in 1805. His patient was a poor rickety dwarf, 50 inches in height, with a true conjugate of less than  $2\frac{1}{2}$  inches. She was admitted to hospital on March 15th and labour commenced five days later. After a hard morning in the hospital, Osiander rested a while, during which time he doubtless considered the procedure to be adopted to deal with yet another difficult case. On examining the

patient, a half starved, pediculi-ridden creature, the cervix was found to be four fingers dilated and the liquor amnii had all drained away. Version was found to be impossible. Sitting between the patient's thighs, he performed the operation in the manner already described. The child escaped so quickly that the assistant was just in time to catch it. The uterus was not repaired and death occurred two days later from peritonitis.

The following year, he tried again - by the same method - but with no more success. Had, however, his subjects been more favourable, Osiander might have had better fortune, for, at both operations, his principles were vindicated.

In 1806, J. C. G. Joerg (1779-1856) of Leipzig, proposed to perform Caesarean section in such a way as to avoid an incision in the body of the uterus, justifying his proposition from the experience of several obstetricians who had seen the child pushed through a rupture in the vagina into the abdominal cavity. After an abdominal incision through the linea alba, he advised opening the vagina, and if this did not suffice, the mouth of the uterus also, by an incision and extracting the child through this artificial opening. He only once performed Caesarean section, and that on a dead woman, and in that case, he saw he could extract the child very easily by incising the lower part of the uterus.

Like Osiander, he incised the peritoneum, opening

its cavity, thereby being inferior to his successors. There was also grave risk of injury to the ureters.

In the last of his aphorisms, Joerg expressed the belief in the possibility of such an operation and suggested that surgeons should try it out on women dying late in pregnancy. However, he was rather lukewarm in his advocacy of his operation and its advantages over the older procedures, and only performed it once himself and that on a dead woman. He did not urge it upon his colleagues as did Oslander from whom it is not unlikely that Joerg obtained his idea.

In 1820, another German surgeon, Ferdinand Ritgen, took a great step forward by proposing to operate without opening the peritoneal cavity. He acknowledged his obligation to Joerg on the one hand and to Abernethy and Cooper on the other, the first having proposed the incision in the vagina, and the others having shown how to ligate the external iliac artery without opening the peritoneal cavity. He called his operation "Bauchscheidenschnitt." The steps of the operation which he proposed were as follows:-

- (1) By means of the introduction of a male catheter, the bladder was pushed to the left side. The uterus was pulled over to the same side.
- (2) A semilunar incision was made in the abdominal wall just above the right inguinal ligament.

- (3) The incision was continued through the muscles, in the same direction, taking care to avoid injury to the peritoneum. Any arteries encountered were ligated.
- (4) By means of blunt dissection, the vaginal wall was exposed in the depths of the wound.
- (5) A guarded sound with the stylet drawn back was passed into the right lateral fornix.
- (6) The stylet of the sound was pushed through the vaginal wall the surrounding parts being protected by the thumb, fore and middle fingers of the left hand.
- (7) A probe pointed bistoury was passed along the groove in the stylet and the vagina opened towards the urethra, great care being taken to avoid injury thereto. The sound was withdrawn and the vaginal incision enlarged towards the rectum as far as possible without injury to that organ.
- (8) With this incision completed so as to leave a curtain of vaginal wall, two or three inches long, hanging down from the right half of the uterus, this curtain was divided in the middle with a pair of scissors up to the edge of the uterus.
- (9) The wound was covered with a piece of fine linen soaked in warm oil and expulsion of the child by uterine contraction awaited, during which time the womb was drawn up vigorously and to the left. If necessary, the lower part of the uterus could be incised on the right side in order to facilitate

passage of the child.

- (10) After the foetus<sup>u</sup> had been expelled, the wound was cleaned and the skin and muscles united by interrupted sutures and adhesive plaster. The wound in the vagina was left alone but later moistened with oil. To avoid ventral hernia a broad bandage was applied.

On October 21st, 1821, Ritgen had the courage to subject his views to the test of experience. The patient was a woman of 37, suffering from extreme pelvic deformity due to osteomalacia. Severe haemorrhage was encountered on incising the vagina which was checked by the application of cold water sponges. Labour pains failing to expel the child, it was decided to incise the os uteri and extract the child's head, but on withdrawing the sponge, profuse haemorrhage occurred. It was resolved to leave the expulsion of the child to nature and during the next half hour, restoratives were applied to the patient. Contractions by this time had entirely ceased and the patient was failing fast although the child was still lively. Pubiotomy was abandoned owing to haemorrhage. While consultations were going on, the patient fainted; when she rallied the ordinary Caesarean section was rapidly performed. The patient died two and a half days after the operation.

The scene now shifts to France where L.A. Baudelocque ("the nephew") on August, 19th, 1823, defended in the medical school of Paris a thesis entitled "Nouveau procede pour pratiquer l'operation Césarienne" and later

in the same year read a paper before the Cercle Médical on the same subject entitled "Nouveau moyen pour délivrier les femmes contrefaites a terme et en travail, substitué à l'opération appelée Césarienne." He called his operation gastroelytrotomy and had such a high opinion of its value that he declared that Caesarean section, hitherto so terrible for the mother, could no longer take her life! Bitter experience made him change his opinion.

He suggested several methods of operating. In the first the abdomen was opened by an incision along the edge of the rectus muscle and the membranes were then ruptured per vaginam. The peritoneum was gently separated from the iliac fossa and the vagina exposed, any palpable arteries therein being ligated. With the left hand in the vagina, an incision into it was made, as low down as possible, through the external wound. This incision was extended to a length of about  $4\frac{1}{2}$  inches and the expulsion of the child left to nature, or short forceps were used if necessary.

Later he proposed the inguinal external incision, and, through the vaginal opening, pulling the os uteri into the abdominal wound, delivery following as before.

He performed one operation, the date of which is unknown, but his experience was similar to that of Ritgen - severe haemorrhage on incising the vaginal wall, abandonment of the attempt and performance of the "classical" operation. The patient died.

In 1844, another pamphlet from him appeared on the

subject entitled "Operation Césarienne - Elytrotomie, ou section du vagin, précédée, ou non, de la ligature ou de la compression de l'artère iliaque interne." In it, he proposed that the internal iliac artery should be ligatured during the operation and that the uterus being drawn forwards, the vagina be opened from its posterior aspect.

Finally he suggested a transverse abdominal incision from the anterior superior iliac spine on one side to that on the other. He favoured the last two steps, thereby abandoning the important point of not opening the peritoneal cavity. In this pamphlet he reported a case operated on by him the previous year. Owing to an unfortunate accident, he was obliged to ligate the common iliac artery. The patient died 74 hours after operation, apparently from peritonitis, although Baudelocque attributed her death to the administration of twelve drops of laudanum!

So ended Baudelocque's efforts. Like his predecessors of whom he made no mention, he started off with high hopes but finally gave up the unequal struggle; in fact he finished by denouncing the operation altogether.

About the same time that Ritgen and Baudelocque were studying the problem an American physician hit upon an idea similar to that of Ritgen. He was Dr. P.S. Physick and his proposition formed the substance of a letter written by W.E. Horner, an American Professor of Anatomy, to W. P. Dewees, and



inserted in the latter's "Compendious System of Midwifery." Dewees remarked that "The importance of its contents will amply apologise for its introduction." The letter, which was dated September 29th, 1824, ran as follows:-

My dear Sir,

The Caesarean operation as commonly performed, puts into such danger the life of the mother, that it is still a desideratum to ascertain some modification of it which may diminish its fatality and thereby infuse the profession with more confidence and promptness in undertaking it. Several changes have been proposed in it from the time of its first adoption, principally with a view to avoiding the chances of wounding the urinary bladder, or of cutting through the large vessels, which, in a state of pregnancy, occupy the broad ligaments of the uterus. In their principle, they differ immaterially from each other, as they all involve the necessity of cutting into the cavity of the peritoneum, in which circumstance, it is generally conceded the great danger of the operation depends.

This operation has been a frequent subject of conversations which I have held with our common friend Dr. Physick and I have been as often instructed by the views which he has taken of it. More than two years ago, it (the Caesarean operation) being then a matter of particular inquiry with me, I was struck by the following proposition of his, Dr. Physick's, in regard to it, which made a very strong impression on me and the

justness of which I have ever since been extremely anxious to verify by dissection.

It is well known to anatomists that but a very small portion of the upper anterior part of the vagina, in the unimpregnated state is covered by the peritoneum and that the portion of peritoneum which lies upon the fore-part of the cervix and vagina is connected to them by a long loose cellular tissue which allows the peritoneum in the distensions of the urinary bladder, to be separated still further up from the vagina.

It has not been equally remarked that this peritoneal covering of the vagina is of a very fugitive character, and that if the moderate distensions of the bladder be much increased, the peritoneum even leaves the anterior face of the cervix uteri, and its reflexion to the bladder departs thence at the lower part of the body itself of the uterus.

By a fortunate coincidence, I have at this moment under my observation, these parts about the end of the sixth month of pregnancy, the foetus having just been expelled from the uterus, with its head remaining in the vagina, owing to a breech presentation. It may be mentioned in passing that there is good reason to believe that the uterus here took on the parturient action, after the other phenomena of life had ceased. In this case, I found the peritoneum drawn off from the vagina by a common distension of the bladder. And by my drawing moderately at the bladder, the peritoneum leaves the cervix uteri after the same manner that it does on the

unimpregnated state.

Dr. Physick, founding his ideas upon a similar observation made in early life, during the dissection of a pregnant woman, proposes that in the Caesarean operation, a horizontal section be made of the parieties of the abdomen just above the pubes; and that the peritoneum be stripped from the upper fundus of the bladder by dissection through the connecting cellular substance, which will bring the operation to that portion of the cervix uteri where the peritoneum goes to the bladder. The incision, being continued through this portion of the uterus will open its cavity with sufficient freedom for the extraction of the foetus, all of which the doctor supposes may be done by a careful operator without cutting through the peritoneum.

It is evident that if this be a practicable operation, it will diminish immensely the tendency to peritoneal inflammation, and will, in fact, put it on a foundation of danger very closely allied to the taking up of the external iliac artery near its origin by turning aside the peritoneum, an operation the success of which is sufficient to justify any competent person in undertaking it.

Knowing the value which you, as well as myself, put upon the suggestion of a person whose mind is so remarkable for its professional sagacity and resources, I have thought that even a proposition not yet confirmed by actual experience of its success, would not be an

unacceptable addition to the fund of information  
you are about to communicate to the public.

I remain, very sincerely,  
your friend,

To/ Dr.Deweese.

W. E. Horner, Sept.28th,1824.

Dr. P. proposes that the operation be performed with  
a moderately distended bladder, and that a catheter  
should be introduced previously to ascertain its situation.

Probably Physick himself doubted the feasibility  
of his plan since neither he - nor Dewees - ever performed  
it. It seems reasonably certain that his idea was  
original and that he had not heard of Ritgen's suggestion.

It is open to doubt, however, if the same can be  
said of the recommendation of Sir Charles Bell, whose  
"Institutes of Surgery" were published in 1837. After  
relating a Caesarean operation in which he acted as  
assistant, he continued "on such a case (one in which  
the mother cannot be saved by embryulcia) recurring,  
time and opportunity being given for the performance  
of the operation, I would recommend the following  
precautions:-

- (1) That the incision through the abdominal wall  
should be made in a direction from the crest  
of the pubes obliquely outward. The  
epigastric artery would require to be tied.

- (2) Press up the peritoneum - a matter not difficult

in the pregnant state of the uterus -  
and reach the vagina or uterus under the  
peritoneum.

- (3) Getting at the vagina or certainly the lower part of the uterus, make a small incision - introduce a finger - dilate slowly, imitating in this the natural labour; there would be neither pain nor danger by delay.
- (4) Break the membranes, and, if the action of the uterus should be as strong as I have seen it in the last case, permit the head to advance; if not, seize and deliver by the feet as in the operation of turning."

He pointed out that such a procedure avoided opening the peritoneal cavity and that there was less risk of haemorrhage as compared with an incision into the body of the uterus and also that the patient's prospects of recovery would be greater.

Bell made no reference to the work of his predecessors but it is not unlikely that he had heard or read of them. The new procedures had been discussed in textbooks printed in English, such as those by Velpeau and Dewees, as well as in foreign books. One point in his technique is noteworthy - the small vaginal incision and use of the finger for slow dilatation, thereby lessening the risk of severe haemorrhage which had so hampered Ritgen and Baudelocque.

With the exception of a case of a combined Ritgen - Joerg operation reported by Testa, (Nurnberger, 1909) as having been performed by Ciantlone in Italy, in which the lower segment was reached - only after transversing both anterior and posterior walls of the bladder, oblivion was the fate of these recommendations and attempts to tackle one of the greatest problems of current obstetrics - to lessen the great danger attending the performance of Caesarean section. Looking backward little else could be expected. Four reasons can be given for the failures - lack of anatomical knowledge, failure to appreciate the importance of suturing the uterine wound where the incision extended into that organ, lack of anaesthesia necessitating great speed in operating and lastly poor surgical technique including absence of antiseptics and asepsis.

Caesarean section continued to take its heavy toll but within the short space of sixteen years - 1811 to 1827 - four infants were born whose discoveries were to effect a great change in surgical and obstetrical technique. These four were, James Young Simpson born 1811, Ignatz Semmelweis born 1818, Louis Pasteur born 1822, and Joseph Lister born in 1827. The sun of hope was rising on the horizon of despair.

To conclude this section of our history, it will be of interest to examine the opinion of the writers of the time concerning these various propositions.

The majority did not even mention them and those that did, with a few exceptions, condemned them.

Kilian (1849) speaking of gastro-elytrotomy, called it "a method of decided importance even if so far without any encouraging results." Meygrier (1833) declared that "Baudelocque's process deserves the attention of practitioners" while Jacquemier (1846) discussed the subject very fully and believed it to be a feasible proposition. He advocated a longitudinal incision through the vagina and cervix but pointed out the risk of infection in the pelvis.

Blundell (1834) discussing Sir Charles Bell's plan said "This dilatation is likely to prove more easy of accomplishment because the substance of the uterus is, perhaps, naturally of a somewhat yielding and obsequious kind and it is not altogether impossible that this method of procedure may be found desirable, not only in these cases in which the placenta chances to cohere to that part of the womb which corresponds with the abdominal incision, but in every instance in which the Caesarean delivery is requisite. This proposal however requires consideration. Confusion and laceration might not without reason be apprehended. By dilating in this manner we should diminish the extent of the uterine incision."

These few were supporters of the new operation. Of the opponents, the writings of Velpeau (1831), Dubois (1834), Cazeau (1893) and Bedford (1861) are most worthy of consideration.



The first mentioned reviewed the works of Ritgen, Baudelocque and Physick. Regarding Ritgen's proposition, he wrote "In the first place, I cannot conceive how it would be possible to incise the apex of the womb without cutting the serous membrane with which it is enveloped; then the difficulties inherent in this proceeding, added to the detachment which would be produced in the iliac fossa, do not appear to me to be of a nature to render the operation at all less serous than those I have mentioned." Criticising Baudelocque, he said he could "scarcely believe it will be found practicable in a majority of cases or that the laceration of the vagina, in addition to the disturbance necessarily occasioned in the iliac fossa or in the excavation, would be less redoubtable than the simple and methodical incision of the peritoneum and womb such as may be performed in ordinary hysterotomy." Physick's suggestion, he dismissed in a few words, declaring that "this operation is but little worthy of its inventor and does not deserve the trouble of its being discussed."

Dubois, who so long governed French obstetrics as an autocrat, in the "Dictionnaire de Medicine" 1834, stated that the new methods of Ritgen, Baudelocque, and Physick, "without offering any advantages present difficulties and dangers from which the other methods of the Caesarean operation are exempt." He

considered the risk of uncontrollable haemorrhage to be very great.

Cazeau believed that the disadvantages of the new operation outweighed the advantages, saying "If the incision in the peritoneum could be avoided, effusion of blood or of sanious or purulent matter into its cavity would not take place and the patient protected from the most efficient cause of death. This advantage is unfortunately so fully balanced by the difficulties of the operation, by the number of vessels wounded, and by the inflammation liable to follow the extensive separation of the peritoneum that the method is now entirely abandoned."

Bedford, who mentioned Joerg, Ritgen and Baudelocque, giving a description of the latter's method wrote - "Plausible as this operation may appear - to me it is the very reverse - it failed completely in the hands of Baudelocque, and I am not aware that it has ever succeeded."

The operation became abandoned and forgotten, no obstetrician even thinking of it for a generation, even in the most desperate case. Thus stood things when Thomas of New York re-invented the operation in an improved form.

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Chapter XCervical or Lower Segment CaesareanSection.Further Attempts.

The year 1870 saw a revival of Ritgen's operation of gastro-elytrotomy at the hands of T.G.Thomas (1831-1903), a noted gynecologist and lecturer who was Professor of Midwifery in the College of Physicians and Surgeons of New York.

In a paper read by him in that year (Thomas 1870) he described how, after essaying it twice on the cadavers of non-pregnant women and once on that of a woman who had died of eclampsia in the ninth month of pregnancy, he performed the operation for the first time on a living subject.

His method was as follows:- After manually dilating the cervix, an incision was made from the symphysis pubes to the right anterior superior iliac spine down to the peritoneum which he found he could easily separate and push upwards so that by blunt dissection, the vagina and cervix became exposed. An incision was then made in the vaginal wall, using as a guide, a sound introduced into the vagina and held by an assistant. His incision was quickly enlarged and the cervix drawn through it into the external wound by means of a blunt hook, the fundus of the uterus meantime being depressed in the opposite direction. The foetus was then easily extracted.

The simplicity and rapidity with which Thomas found he could reach the cervix by this route in his post-

mortem operations greatly encouraged him and when in March 1870 he was called upon to try and save the child of a mother dying from pneumonia in the seventh month of pregnancy he put his proposition into practice and found it equally practicable. In addition to being premature, the child was also malformed and lived only one hour, the mother dying about the same time.

It was obvious that the operation could not be blamed for the death of either mother or child. Thomas believed that his operation was a simple and safe one which could be performed in a few minutes. At the time of his first operation, he had no acquaintance with the work of his predecessors, learning of these later. "I discovered that the idea was an old one and that which I had supposed originated with me, had years ago been tested and thrown aside."

Thomas repeated his views in 1875 but it was not until 1878 that he recorded his first success. His patient was a primipara of 20, a cripple of dwarf growth with one leg permanently flexed over the abdomen by contractures, a conjugate of  $2\frac{1}{2}$  inches and a breech presentation. The operation which lasted for thirtyfive minutes was successful for both mother and child. The bladder was injured but the resulting fistula healed quickly.

In the meantime, a friend of Thomas, A.J.C. Skene, became very interested and after a failure in 1874, the operation being performed after attempts to deliver by version and craniotomy had failed, he had two successes

in 1876. In the first of these the bladder was injured but Skene declared that this was the fault of the operator, not of the operation. The second patient was grossly deformed and mentally deficient but after a stormy convalescence, she recovered. (Skene 1875/6 and 1877).

The operation was discussed at a meeting of the American Gynecological Society in 1878 following a paper by H.J. Garrigues (1878). This speaker recommended opening the vagina by means of a thermo-cautery in order to lessen the risk of haemorrhage, this having caused the failure of Ritgen and Baudelocque. He regarded the method as most promising and deemed its technical difficulties hardly greater than those of herniotomy or ovariectomy. He recommended the use of gastro-elytrotomy, or laparo-elytrotomy as it came to be called, in place of craniotomy or embryotomy in cases with a C.V. of  $2\frac{1}{2}$  inches, or less. In the subsequent discussion, Barker, Thomas, Byford, Campbell and Bozemann took part. Byford was highly in favour of the operation believing the risk of haemorrhage not to be so great as first thought. Bozemann on the other hand declared that it was impossible to open the vagina without injury to the ureter or bladder.

In Britain, T.W. Hime (1878) of Sheffield was the first to try out the resurrected operation. On July 14th, 1878, he was summoned to visit a Mrs. O'M. who had been in labour for 20 hours without making any progress. Labour was obstructed by a large cancerous mass in the retro-vaginal septum. "Having then just read the very

interesting paper by Dr. T. G. Thomas of New York on laparo-elytrotomy, I determined to try it as the state of the woman was so grave that Caesarean section would evidently cause instant death. With the exception of the spray, I employed antiseptic measures. The patient having been placed on the operating table and chloroform being administered, I made an incision through the abdominal wall in the direction of a line extending from the left anterior iliac spine to the spina pubes. After a little difficulty in distinguishing a layer of fat which simulated the appearance of the omentum, the peritoneum was reached and easily recognised being much more ample than in the non-pregnant woman and hanging in folds at the bottom of the wound. I next passed a blunt probe up the vagina and by it pushed the anterior vaginal cul-de-sac into the wound. Seizing this with a pair of hooked forceps, I divided it and passing my finger through the orifice felt the os uteri. Some slight difficulty was experienced at this part alone of the operation owing to the small space which existed between the anterior surface of the enlarged uterus and the brim of the pelvis. Having extended the wound, I passed my hand through it into the fully dilated os which was occupied by the head and bag of waters. I, at once seized a foot and turned and delivered a living male child without the least difficulty, the placenta being delivered simultaneously. The uterus contracted rapidly and there was no uterine haemorrhage. There



was not over an ounce of blood lost in the operation, a couple of small arteries which were divided in the incision having been at once secured by torsion.

In fact, few ordinary labours are completed with less loss of blood. The operation lasted a little over 20 minutes." The patient died  $2\frac{1}{2}$  hours later.

While the small blood loss is noteworthy, it may be that the moribund and probably anaemic condition of the patient influenced this occurrence.

Later in the same year, A.W. Edis (1878), of London, performed a similar operation, but with no better results, on a patient in whom forceps had already been tried ineffectually twice. Remarking that the first two cases in Europe had ended fatally, he declared that "This should not deter us from studying details of the operation more carefully and giving it a fair trial when opportunity offers."

In America, however, other attempts were made by Skene (1888 and 1885), Gillette (1880), Taylor (1883), Jewett (1886)-2 cases) and McKim (1887).

Another case came to light in 1914 and gives a most vivid picture of the obstetrical situation thirty years before. It formed the substance of a letter from G.K. Dickinson of Jersey City to W.R. Nicholson (1914) of Philadelphia. "In reply to your letter of yesterday, I would say that the only operation of that kind with which I was associated occurred to me so long ago that the notes are meagre and my recollection, perhaps, not altogether correct, although very vivid.

Dr. J. J. Van Vorst and myself were the surgeons. Dr. W. F. Watson and some others were assistants. The neighbours were around and vengeance was to be meted out if we attempted anything. The woman was not consulted. Her husband was tentatively agreeable to have something done. Her history was of several confinements, craniotomies, an agonising time and no result. Dr. Van Vorst and myself feared the outcome of this case and were very much impressed by an article which had appeared at this time termed laparo-elytrotomy. I can remember that we congregated in Dr. Van Vorst's office; then when a messenger was sent, we went around the corner, and stood behind the trees with our satchels awaiting the signal. The signal being given we went into the house. It was one of those dark dirty tenements and the last place in the world to do this kind of job. The woman had been in labour several days. The pelvis was narrow; cervix well dilated and soft; secretions were abundant and the pains came on at five minute intervals. She was considerably exhausted from a long period of ineffective labour. We put her to sleep, washed her up, used the carbolic of the day, and made an incision in the right side above Poupart's ligament, cutting through all the structures. Coming down on the peritoneum, we dissected it up until the vagina was reached. This was opened and the baby extracted. The baby died, also the mother. This was done in a little room about twelve feet square with one window. The curtain had to be drawn

on account of the fear of the public. If I remember correctly, the woman lived through the following night, but succumbed the next morning from exhaustion, perhaps beginning sepsis. I remember there was some bleeding but not very abundant. What there was, we easily controlled by packing. The difficulty was in stripping up the peritoneum and reaching the vagina. Surgery in these days being novelties to the most accomplished, and particularly to us, the local condition and psychology of it all rendered the operation more than usually disturbing. So far as I can bring my memory back there is no other incident of importance connected with this case."

In all, therefore, fifteen laparo-elytrotomies were performed about this time with a maternal mortality of 53 per cent and a foetal of 47 per cent. Although the number of cases is small, and several were in a bad state at the time of operation, the results were certainly no worse than those attending the classical Caesarean section in the pre-Sanger era. The bladder was wounded in six out of the fourteen cases (excluding Dickinson) and this, together with technical difficulties and fear of haemorrhage, did not make the operation commend itself to the profession.

The two other advances in technique which took place about the same time - the Porro and Sanger operations - were the principal factors which caused it to fall into disrepute. The innovations or resurrection of gastro-- or

laparo-elytrotomy became engulfed in the waves of enthusiasm for the new operations.

In 1883, however, H. J. Garrigues, a firm supporter of Thomas, in discussing the relative merits of gastro-elytrotomy, the Porro and Porro Muller operations declared that.

- (1) The results of the Porro operation were inferior to those of the Porro-Muller operation and no better than those of gastro-elytrotomy.
- (2) The dangers of haemorrhage, peritonitis and septicaemia were gravest in the Porro-Muller operation.
- (3) The advantage of the Porro-Muller operation lay in the fact that it was possible to operate before labour began.
- (4) Gastro-elytrotomy was less repulsive to the patient, less difficult of execution, and required fewer assistants.
- (5) Gastro-elytrotomy did not sterilise the patient.

With the exception of (3) and (5) the accuracy of such statements is open to grave doubt.

In 1924, A.B.Davis of New York reported 28 cases in which he operated by Thomas's technique with some modifications. The uterus he opened by means of a vertical incision in the lower uterine segment. All cases were "septic" to a greater or lesser degree. All ran high temperatures after operation, and in not a single one did the external wound heal by primary

intention! The maternal mortality in this series was 7.2 per cent. the foetal 25 per cent. - good results for the type of case.

## Chapter X

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Chapter XICervical or Lower Segment CaesareanSection. The Twentieth Century - Success.

In earlier chapters reference has been made to the performance of extra peritoneal and lower segment Caesarean sections during the present century. Further consideration must now be given to it.

Following the advances in the technique of obstetrical surgery, commencing in 1882, it became possible early in the present century to perform Caesarean section with an exceedingly low maternal mortality - always provided that the operation was carried out early in labour on a patient who had not been subjected to previous handling. In such cases the ordinary "classical" Caesarean section gave excellent results. A very different state of affairs held with regard to Caesarean section performed late in labour, or upon women who came to the operating table only after repeated vaginal examinations or fruitless attempts at delivery by forceps, version or other means. Statistics already given show the high mortality rate in such cases. As time went on it became recognised that unless something more was added to the equipment of the obstetrician, the operation of craniotomy would still require to be performed not infrequently, since the mortality of this operation was much less than that of Caesarean section performed under similar circumstances. The only other alternatives were pubiotomy or hysterectomy, but neither were satisfactory.



The former was found to be a dangerous procedure in neglected cases from the point of view of maternal sepsis while the child had to undergo pelvic delivery at a time when as a result of previous traumatisms of labour or human endeavour, it was ill-conditioned to withstand further insults. The great disadvantage of hysterectomy lay in the loss of the power of reproduction.

It was in order to deal with such cases that German obstetricians, led by Fritz Frank, endeavoured to discover an extra-peritoneal method of ingress to the uterus without the disadvantages attaching to previous attempts in the same direction. Obviously if the risk of infecting the peritoneal cavity with foul amniotic fluid could be avoided, it would be a great step forward.

It was considerations of this nature that led Frank in 1906 and 1907 to propose and carry out supra-symphysary delivery. Among the disadvantages of Caesarean section as then performed, Frank enumerated the large incision, the rough handling and the increased vascularity of the uterus in pulling it out of the peritoneal cavity, the subsequent difficulty in controlling haemorrhage and the danger of sepsis arising from below.

Keeping in mind the changed relation of the bladder and peritoneum in the later weeks of pregnancy and the first stage of labour, Frank put his patient in the Trendelenburg position and made a transverse incision about  $4\frac{1}{2}$  inches long above the symphysis pubis, down to the peritoneum, care being taken not to sever the muscles

from their point of attachment in order that a stump might remain to allow exact suturing of both muscle and fascia. After bleeding points had been controlled the incision was continued through the parietal peritoneum. A similar cross cut was then made through the peritoneum over the distended lower uterine segment. After stripping up the peritoneum from this region, he united the upper flap of the parietal peritoneum to the upper flap of the visceral peritoneum, thus shutting off the general peritoneal cavity from the region of the bladder. The uterus was opened by a three inch transverse incision in the thinned out lower segment, and through this opening, the child was delivered by pressure from above. The placenta was immediately removed.

His early cases were drained through the uterine wound into the vagina by iodoform gauze but later he closed the uterus completely with catgut sutures unless there was much fear of infection.

This method was in reality a transperitoneal operation but later he attempted a true extraperitoneal line of approach. After incising the abdominal wall as before, instead of dividing the peritoneum, he made a small window in it to the left of the bladder, so as to control the separation of the utero vesical fold by sight, closing it again with catgut.

Frank claimed for his operation that blood was saved, and that peritonitis would be prevented, the

uterus remaining in the peritoneal sac, and the intestine being kept out of the way. Further it would increase the range of indications for the operation and would be performed when the "classical" operation was contraindicated owing to fear of infection. As he himself put it, he produced a sort of artificial rupture of the uterus without the peritoneum being involved.

Discussing the indications for the operation, he included the following:-

- (1) Where delivery was considered necessary on account of danger to the mother or child with the foetal head free above the brim, the soft parts undilated, and tetanic contraction of the uterus was present.
- (2) Prolapse of the cord with the child alive.
- (3) Threatened rupture of the uterus.

Under such circumstances Frank declared suprapubic delivery was indicated whether fever was present or not. He believed that the operation presented no more difficulties than perforation of a living child.

In 1906, at the International Congress at Lisbon, he reported 7 cases operated on by his method and the following year, six more. All the mothers recovered. Two children were lost, one from a fractured skull, the result of previous attempts to deliver by forceps, and the other, on the ninth day, the mother having had a placenta praevia.

Thus did Frank redeem from oblivion the procedure which T. G. Thomas and his friends had abandoned as impracticable. Writing in the first flush of his success, he said, "Wer opfern nicht, sodern wir retten sie beide" (we sacrifice not, but we save you both).

German surgeons at once became interested in the new technique and it was not long before other operators followed in Frank's footsteps but modifying in certain directions, the method he had employed.

Veit of Halle (1907) reported two successful cases, believing that the ordinary Caesarean section was indicated only when the patient had been long enough in hospital to ensure that there was no fear of infection. His colleague, F. Fromme (1908) after performing four successful cases by Frank's method, later substituted longitudinal for transverse incisions and after closure of the uterine wound, restored the peritoneal flaps to their former status, the peritoneal cavity having been kept closed in the meantime with clamps or temporary sutures.

One of the earliest to adopt the idea of Frank and Veit was Hugo Sellheim, (1871-1923), and he published four different methods of procedure. In his first two operations he adopted a purely extra-peritoneal course (Sellheim 1). He differed in three essential particulars from Frank:-

- (a) He substituted the Pfannenstiel incision for that of Baudenhaur.

- (b) Instead of trying to raise the utero-vesical peritoneum from the bladder which had been moderately distended with fluid in order to indicate its boundaries, he began laterally with blunt dissection by swabs and completed the separation medially with scissors.
- (c) The peritoneum having been further raised and the bladder pulled forwards, with a retractor, the wall of cervix uteri and lower segment were incised longitudinally as low as possible.

He stressed the importance of the last step - "I am not content like Frank and Veit to place my incision simply in the region of the lower segment or the isthmus of Aschoff." In the second method the technique was as first detailed <sup>until</sup> while the parietal peritoneum was reached; this was then incised transversely just above the bladder and the upper edge of the peritoneum united to that over the anterior wall of the lower uterine segment. The vesical peritoneum was then divided in the depth of the utero-vesical pouch and the cervix exposed, the peritoneal folds being pushed up and the bladder downwards. The third method was but slightly different, the upper flap of peritoneum being raised and its edge sutured to the upper edge of the parietal peritoneum.

Sellheim's fourth method was a wide departure from his previous three plans and constituted an attempt to treat certain rare cases which presented a grave danger of septic infection (e.g. sloughing growth of the cervix).

He described it as "nothing more than an occasional makeshift - possibly the best - where for example, in spite of the danger to the life and health of the mother, a child is unconditionally desired, on the supposition that for the future all chance of a further conception is very remote." After a longitudinal incision through the linea alba, the parietal peritoneum was sutured to the edge of the skin incision. The uterine peritoneum having been incised, its edges were sutured to the parietal peritoneum near the edge of the skin incision. After extraction of the child through a medial uterine incision, the edges of the uterine wound were stitched to the edge of the abdominal wound. An open fistula was thus created. If spontaneous closure did not occur, a plastic operation was undertaken for this purpose at a later date.

Many modifications of the methods already described were made, notably by German surgeons. The flood of literature on the subject in important German medical journals is reminiscent of that which followed the introduction of Fritsch's fundal incision. Some of the most important may be mentioned.

Pfannenstiel (1908) at the end of a paper in which he described an unsuccessful attempt to perform an extraperitoneal operation, advocated the incision known by his name, through the skin and fascia, with a longitudinal incision of the peritoneum and cervix.

Rubeska (1908) offered a method for badly infected cases. Following a low medial incision in the abdominal wall, he united the parietal to the uterine peritoneum all the way round and delivered the child. The uterine wound was treated by the open method - a similar procedure to Sellheim IV.

Hoffmeir used continuous suture to unite the peritoneal flaps, did not re-open them but employed drainage.

In America, the first to take up the new technique was Barton C. Hirst. After reading of it, he went to Germany and saw it performed by a number of surgeons there, notably Sellheim in Tübingen whose first and later second method he followed on his return home. Although pleased with the results, he thought the technique slow and awkward. He devised in 1914, a method which closely resembled the method of Veit and Fromme although Hirst was not aware of this fact at that time. The only difference in the two procedures was that whereas Veit and Fromme clamped the peritoneal flaps and united them by sutures after evacuation of the uterus, Hirst performed this before opening the uterus. The whole of his operation was, therefore, extraperitoneal instead of merely the latter part as with Veit and Fromme.

Whilst Hirst called his method extra-peritoneal, only his first case was a true one, the others being transperitoneal operations. He reported in 1914, sixteen cases, all successful. Two of them had placenta praevia and as a result of experiences, Hirst did not favour the operation



in such circumstances. He also remarked that "the extra-peritoneal Caesarean section has a distinct advantage even in the clean case, unless the operation is done for placenta praevia, or premature detachment of the placenta and must be done quickly with least loss of blood."

J. W. Markoe followed Hirst and, also in 1914, reported a short series of cases, five in number with two deaths.

Following the work of Frank, who as we have seen abandoned the true extraperitoneal operation in favour of the transperitoneal procedure, efforts were made to perfect the former method and, in this connection, the name of Latzko calls for special mention.

His technique which he did not recommend for infected cases was as follows:- the bladder was emptied and then distended with 200 -300 ccs. sterile water. A longitudinal abdominal incision was made along the margin of the left rectus muscle. Its anterior sheath was divided and the muscle pulled over to the left, the posterior sheath being carefully separated from the bladder. The left lateral limit of the bladder was defined and drawn over to the right by a retractor and gradually emptied. By means of blunt dissection the wall of the lower uterine segment was exposed and incised, the child being extracted by forceps or traction on the limbs in a breech presentation.

Latzko first described his method in 1908 and a

slightly modified technique was described by Doderlein the following year. He made a Pfannensteil incision and approached by blunt dissection the lateral aspect of the lower uterine segment, displacing the bladder laterally and opening the uterus in the mid-line. In 1911, he reported 32 cases of extraperitoneal Caesarean section using an inguinal incision, stating that the peritoneum did not come into view as this incision led directly into the parametrium. After pushing away the bladder, the uterus was opened as near to the middle line as possible owing to danger of haemorrhage accompanying a lateral cut.

In 1915, O. Kunster evolved a modification of the extra-peritoneal Caesarean section which gave satisfactory results in appropriate cases. The main difference between his technique and that of Latzko was that whereas, the latter approached the lower uterine segment from the front, Kunster, making his abdominal incision first outside the outer border of the left rectus muscle, made his approach from the side by pushing up the peritoneal reflection from the abdominal wall to the viscera and left side of the bladder.

A simplification of the above somewhat confusing array of different techniques may be made possible by classifying them on the basis of essential differences. In the first group may be placed the methods of Frank, Veit, Fromme, Pfannensteil, Sellheim 2, and Hirst (except for his first case). These were really transperitoneal operations, their differences only arising in the

various means employed to close the peritoneal cavity and whether or not the various folds were restored to their original positions. In the second group may be included the truly extraperitoneal method in which that cavity was not opened - Sellheim 1, Latzko, Doderlein and Kunster. In a third group may be placed Sellheim's fourth method and that of Rubeska - the utero-abdominal fistula.

Such were the early methods of "cervical" or as it was sometimes called, "suprasymphyseal", Caesarean section. The results were encouraging. Many series of cases came to be reported, mostly from Germany, although from an exhaustive survey of the literature made in 1915 by J. W. Markoe, it appears that almost all included both extra and transperitoneal operations some favouring one method and others another.

In 1909, Lewis collected 102 cases and calculated the maternal mortality to be 8.8 per cent. and the foetal 8.6 per cent. P. Baumm (quoted by Markoe) in 1913 reported 100 operations, 50 of which were extraperitoneal and 50 transperitoneal. His statistics showed that former method was the safer, especially in badly infected cases. Of twelve such treated by the extraperitoneal method, all recovered while two out of ten treated by the alternative route died.

In many of the reports, however, it was not stated what degree of infection, if any, had occurred before operation so that, as Markoe said, it was therefore difficult

to come to any conclusion from the statistics as to the superiority or otherwise of one method over the other in already infected cases.

New light was thrown on the subject of cervical Caesarean section by B.Kronig, who, in 1912 claimed that the better results obtained by such methods were not due to the fact that the uterus was approached in an extra-peritoneal manner but because the uterine incision was placed in the thin lower uterine segment instead of in the thick contractile portion of the uterus, and further because the uterine incision was completely covered over by the bladder, thus protecting the peritoneal cavity should infection occur during the puerperium. His operation consisted in opening the abdominal cavity by a low longitudinal incision, separating the bladder from the uterus, making a longitudinal incision in the lower uterine segment and, after extraction of the child, placenta and membranes, closing the uterine incision and completely covering it by suturing the edge of the bladder peritoneum to its original position on the uterus or at a slightly higher level.

Experience showed that such a method offered definite protection against peritonitis and could be performed safely on women advanced in labour and in cases in which the classical Caesarean section was definitely contra-indicated. Further, the incidence of ruptured uterine scars was much reduced, such weak ones, as were encountered being due to the fact that the uterine incision had been

unduly prolonged upwards into the body of the uterus. It was found that that portion of the incision placed in the cervix usually healed firmly while that portion of it which extended into the musculature might show some weakness or thinning.

A transverse cervical incision was the next step in the evolution of the lower segment operation. This permitted the placing of the incision entirely in the lower segment without in any way encroaching on the musculature.

The news of these new operations spread abroad and papers on the subject appeared in French and Italian journals. The popularity of the Kronig operation was pronounced in the United States, thanks mainly to the enthusiasm of A.C.Beck and J.B.de Lee.

In 1919, the former described a modification of Kronig's operation in an attempt to relieve the tension on the apex of the bladder reflection by employing an upper peritoneal flap to cover part of the wound in the uterus. After stripping the bladder and its peritoneum from the anterior surface of the uterus, the peritoneum on the upper side of the incision was carefully dissected free from its attachment to the uterus. The two flaps were then retracted, and the child extracted through a vertical uterine incision. The upper peritoneal flap was then brought down over the superior portion of the closed uterine incision and anchored with catgut sutures. The bladder reflection was then carried about one cm.

above the site of the original transverse incision in the peritoneum, thus overlapping the two peritoneal flaps.

In 1921, Beck reported 83 cases performed by this method by 15 different operators with a gross mortality of 3.6 per cent. 71 of these cases were "suspect", the remainder elective procedures. While admitting the technical difficulties attending his method, he declared that it offered much greater protection against haemorrhage, peritonitis and adhesions, that convalescence was shorter and that there was much less risk of rupture of the uterine scar in the event of subsequent pregnancy.

In 1922, J.B.de Lee and E.L.Cornell, after several years experience, reported 145 cases of the lower segment operation, to which de Lee gave the name of Laparotrachelotomy, with but one death. The enthusiasm continued. In 1930, J. Greenhill reported 1,059 cases Caesarean section performed between 1910 and 1929. 147 of these were classical operations with a maternal mortality of 5.76 per cent., while it was but 1.26 per cent. in the remaining 874 operations of the lower segment variety. In 1935, E.F.Daily reported 500 lower segment operations performed in the Chicago lying-in hospital from 1931 to 1934 with but one death attributable to the operation - a truly remarkable result. Four other patients died, two from heart disease and two from tuberculous meningitis.

In the United Kingdom, the operation was introduced by Eardly Holland and Munro Kerr in 1921. The former said

"Satisfactory as the classical operation is, it has certain disadvantages, both in theory and practice, and these have been coming much to the front lately. In fact the present is a disconcerting period of unrest about Caesarean section." After an experience of nine cases, he declared himself as well satisfied with the results. Munro Kerr, who followed, mentioned his experiences with twenty two cases and contrasted the classical operation unfavourably with the lower segment operation.

Kerr and his colleague, Hendry in 1926 reported their experiences with 107 cases of the lower segment operation with but four deaths, all "suspect" cases and in the same year the advantages of the new operation were discussed by them and by de Lee, Holland and Essen-Moller of Sweden at the Colombe Hospital centenary celebration. Nevertheless it was difficult to persuade the obstetricians of Great Britain to adopt the new operation, and it was not until after the publication of a paper by J.St.George Wilson of Liverpool in 1931 that the operation came into common use. His report of 50 cases with but one death was soon followed by a number of others such as those by K.V.Bailey (1934), H.Evers (1934), Munro Kerr (1935) - to mention but a few.

Considerable discussion has centred round one important step in the operation - the uterine incision - should it be transverse or vertical? De Lee and some of his American colleagues still favour the longitudinal incision but in recent years a number of operators both



in this country, (Munro Kerr (1937), Bailey (1934), Bonney (1933) and St. George Wilson (1931), and in America (Stevens (1934), Hefferman (1935) and Phaneuf (1936) have favoured the transverse incision.

Munro Kerr (1935) recommends a semilunar incision (with the curve directed upwards.) He believes that through a transverse incision the child can be more easily extracted, and there is no danger of the wound extending into the upper part of the uterus nor of injury being done to the bladder should it extend downwards. Further a transverse incision favours a quiet healing. The general objection to the transverse incision is the danger of its extending into the uterine vessels at the side but this, says Munro Kerr, has not been his experience except in one case.

The lower segment operation is now a definitely established procedure and except in certain cases, such as placenta praevia, and those requiring very speedy operation such as a severe case of accidental haemorrhage of the concealed variety, is preferred by most operators to the classical variety of Caesarean section.

Compared with the classical section it possesses the following advantages:-

- (1) A "trial" labour is permissible with minimum danger to both mother and child especially in primiparae so that,
- (2) The number of necessary Caesarean sections is diminished.

- (3) The risk of subsequent sepsis is less.
- (4) The mortality is lower.
- (5) Convalescence is smoother.
- (6) The risk of rupture of the uterine scar is greatly reduced.
- (7) Haemorrhage from the uterine incision is less.
- (8) The wound can be repaired better, the uterine wall being thinner, and it can be completely and easily covered by peritoneum. It is also quiescent after delivery.
- (9) Post-operative intestinal distension (in some cases leading to ileus) is much less than after the classical operation. According to Bailey (1934) and Phaneuf (1931), this is largely due to the squeezing of blood or infected fluids into the peritoneal cavity through the uterine incision by active contraction of the body of the uterus during the first hour or two immediately following the operation.

While the popularity of the lower segment operation gained ground but slowly in the United Kingdom, that of the extraperitoneal operation has been even less. It was introduced in 1908 at the Annual meeting of the British Medical Association by Zweifel but no great enthusiasm greeted it. In his notable "Caesarean section in the United Kingdom, Routh (1911) declared "whether extraperitoneal Caesarean section will ever

take the place of the classical Caesarean section in non-infected cases or whether Sellheim's utero-abdominal fistula will be substituted for Caesarean hysterectomy in infected cases, time will show.

As regards infected cases, however, the opinion is steadily gaining ground on the continent that extra- or trans -peritoneal Caesarean section is a dangerous proceeding. It is obvious that it must be so and the caution of British obstetricians in refusing to adopt the present indications for the operation and its technique, as at present performed, is abundantly justified." He preferred hysterectomy in infected cases, believing the risk of peritonitis, parametritis and cystitis to be considerable.

Hasting Tweedy of Dublin and A.W.Russell of Glasgow were among the very few who favoured the operation. The former reported three cases, all successful, in 1910. He preferred the trans-peritoneal method, like Hirst suturing together the two flaps of peritoneum before making the uterine incision. He believed that the supposed disadvantages were purely theoretical and in 1911 remarked that "the prejudice manifested towards it is still very puzzling." A.W.Russell in 1912, described six cases, all potentially infected, from which all the children and five mothers were saved. Preferring the true extra-peritoneal method of Doderlein, he declared it was a difficult operation and should not be looked upon as an alternative to the classical section, but should be

reserved for cases advanced in labour with a stretched lower uterine segment or impacted shoulder or certain cases of placenta praevia if the child was still alive. Extraperitoneal Caesarean section is still not much employed in this country although E. Williams in 1933 reported 9 successful cases employing the technique of Latzko. A. W. Bourne and L. Williams, (1939) describe the operation as "long, difficult and hazardous, even in the hands of experts and state "the time is long and the danger of wounding the bladder, peritoneum and ureter are insistent."

In the United States, however, Latzko's method has enjoyed from 1923, a fair degree of popularity. In 1914, J. J. Druskin of New York reported a successful case by a combined Latzko-Sellheim method while J. W. Markoe, in 1915 reported a short series of cases done by the Latzko method. Little more was heard of it however until 1923 when, K.B. Steele (1930) tells us, Jellinghaus, impressed by the results of A.B.Davis efforts with gastroelytrotomy in apparently hopeless cases, reviewed the German literature in an effort to find a method fraught with fewer technical difficulties. He selected Latzko's method and introduced it into the New York Lying in Hospital in 1923.

K. B. Steele in 1930, reported 59 cases with 5 maternal deaths, three still births and three neo-matal deaths. The peritoneal cavity was accidentally opened on ten occasions but closed before opening the uterus.

The bladder was injured in three cases. The average number of hours in labour before operation was 29 and each case had been examined per vaginam, on an average five times. H.T.Burns (1930) was another supporter of the operation in suitable cases and in 1935 described 79 cases with a maternal mortality of 2.52 per cent. Similar reports came from H.B.Perrins, (1936) and A.H.Aldridge (1937). All these authors wrote in favour of Latzko's method in potentially infected cases. Perrins being of the opinion that it filled a definite gap between laparo-trachelotomy and the more radical extra-peritonealisation of the uterus and method of Porro - although not replacing these where such procedures were indicated. He declared the absence of post-operative shock and smoothness of convalescence warranted a widening of the indications for this operation.

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Chapter XIITHE PORTES OPERATION

One final method of Caesarean section remains to be described - the Portes operation. It consists in performing the operation by the usual classical manner followed by temporary exteriorisation of the uterus. It was first performed by Louis Portes at the Maternité de Port Royal de Paris, on the service of Dr. Demelin, on December 14th, 1923. The operation was never one of choice but only of necessity, being designed to deal with frankly infected or hopelessly neglected cases in which the necessity of abdominal delivery is imperative.

It is carried out in two stages. In the first, the pregnant uterus is delivered from the abdomen through a long abdominal incision, which is then closed behind the uterus as far as the cervix. A high uterine incision is then made and the child, placenta and membranes extracted. After closure of the uterine wound, the uterus is allowed to remain on the abdominal wall. In the second stage, one of two methods are employed. If the patient does well, the uterus is allowed to involute, and when clean and the incision soundly healed, the abdominal incision is reopened and the uterus and adnexa replaced in the pelvic cavity. Drainage is placed behind the uterus and the abdominal wall closed. Should, however, sepsis appear to be uncontrollable hysterectomy may be performed extra-

abdominally following the Porro technique after the shock following the first stage operation has passed.

This procedure serves to retain the power of reproduction, one of the great disadvantages attending the performance of Caesarean hysterectomy; further in a two stage operation, the shock is considerably less.

Portes reported his first case to the Societe de Obstetrique et de Gynecologie de Paris in March 1924 and later in the same year, reported three others, all with complete success to both mother and child. The time between the two stages of the operation varied from twenty to fiftyseven days.

A number of other French surgeons adopted the procedure and Phaneuf, in 1927, collected sixteen cases from French literature. One mother, on whom hysterectomy was performed on the ninth day, was lost and two children were still born. In but three of the cases, there was sepsis of greater or lesser degree in the uterine wound. The uterine wound frequently broke down and two attempts at secondary suture were not a success.

Couvellaire (1925) stated that he knew of 32 cases in which the Portes operation had been performed, and the uterus later returned to the pelvic cavity, with two deaths - a mortality of 6.2 per cent. Such a mortality is extremely low when it is considered that all were cases frankly infected.

At first the obstetrical future of these patients gave rise to considerable anxiety but A.Couvellaire (1926)

reported the case of a woman who, after undergoing a Portes operation in 1924, successfully carried to term a fourth pregnancy from which she was delivered by classical section in 1926.

Portes operation has never found favour in Britain - Munro Kerr (1937) called it "dreadful to contemplate." Phaneuf (1927) reported a successful case from the United States. He performed the first stage after six attempts to deliver by "high" forceps had failed. The child was still born. In spite of the development of an abscess on the neck, phlebitis and pneumonia, she recovered and the secondary operation was successfully performed forty days after the first.

The indications for such an operation are very limited but would appear to have some degree of usefulness in certain cases - cases which, however, should never occur. The majority of obstetricians would prefer to perform craniotomy in severely infected patients.

## Chapter Xll

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Chapter XlIIPost-mortem Caesarean Section.

Reference has already been made in this history to post-mortem Caesarean section and its performance in the earliest times. The matter may now be considered further.

While practically all the early writers on surgery were strongly opposed to its performance on a living woman none disputed the propriety of it on those dying in the later months of pregnancy. Indeed, they dare not, because as will presently be recounted, stringent rules, both legal and ecclesiastical, existed on the subject.

Guy de Chaulic, (1298-1368), the most brilliant surgeon of the fourteenth century, knew of the operation and said "Let the woman be opened with a razor along the left side, inasmuch as that part is freer on account of the liver.

Ambroise Pare wrote at considerable length on the subject. "If all the signs of death appear in the woman that hath been in travail, and cannot be delivered, there must be a surgeon ready and at hand which may open her body as soon as she is dead whereby the infant may be preserved in safety." After remarks on the foetal circulation, he went on "Therefore because death maketh all the motions of the mother's body to cease, it is far better to open her body as soon as she is dead, beginning the incision at the cartilage Xiphoides or blade and making it in the form of a semicircle, cutting

the skin, muscles and peritoneum, not touching the guts; then the womb being lifted up, must first be cut, lest that, otherwise, the infant might perchance be touched or hurt with the knife." The life or death of the foetus was judged by the presence or absence of pulsations in the umbilical cord. (Pare 1678).

Pare's pupil, Guillemeau, (1612), also stressed the importance of the operation following the decease of the mother "that thereby the child may be saved and receive Baptism.....the which ought to be observed in every well governed Commonwealth: for, "Jurisconsulti eum necis damnant, qui gravidum sepelierit, non prius extracto foetu, quod spem animantis cum gravida permissa videatur." The lawyers judge them worthy of death who shall have buried a great-bellied woman that is dead, before the child be taken forth, because, together with the mother, they seem to destroy the hope of a living creature."

He stressed the necessity of ascertaining that the woman was truly dead and recommended that her relatives and friends "do all confess that her soul is departed." This having been done, the operation must be carried out immediately. During the period immediately before the death of the mother, he advised that "the midwife or else some other woman shall hold her hand within the neck of the matrice to keep it open as may be possible; for though we know he breathes only by her arteries, yet notwithstanding, the air that may enter therein, doth not only hurt, but doth verie much good." After extraction of

the child, the placenta was removed and laid on its abdomen and bystanders were advised to take "a little wine in their mouth and spit it into the child's nose, ears and mouth."

Dionis (1719) wrote in the same strain but added a rather curious rider. He insisted that the mother should have a gag put into her mouth "not because I think that the child breathes in the womb as the vulgar do; who if it is found dead, which is very often the case, are sure to lay the blame on the surgeon if he has not put a gag in the mother's mouth. He must by no means omit this circumstance, for the satisfaction of those that are present and to put it out of the power of silly women and others who know nothing, to throw malicious reflections upon him." He also stressed the necessity of observing whether the child was alive or not in view of the surgeon's evidence being the vital factor in possible law suits.

Subsequent writers wrote in similar terms.

All the older nations had more or less stringent rules on the subject of post-mortem Caesarean section which doubtless reflected to a considerable extent the medical sentiment of the times. Reference has already been made to the old Roman Law which forbade the burial of pregnant women before the "fruit be taken from their bodies" and disobedience to this mandate was considered as appending grounds for a legal suspicion that a living child had been killed.

To fortify this ancient usage, without compromising



the lives of women who might only be in a state of apparent death, the Senate of Venice issued decrees in 1608 and again in 1721, which ordered severe penalties upon those members of the profession who should operate on a woman, supposed to be dead, without the same degree of care as if the operation were being carried out on a living woman. It may be safely assumed therefore, that patients had been lost by careless surgery, the operator presuming death when the woman was still alive.

At times, considerable difficulty had been experienced in deciding whether the woman was or was not dead and errors of judgement occurred from time to time. Thus Baudelocque, the elder, related a case where an accoucher opened into the uterus of a woman believed dead. He extracted the child but fled, the moment the woman, who apparently only had fainted, gave forth a sigh and complained of the injury done to her. It was with difficulty that the patients relatives were able to persuade the surgeon to return and sew up the wound. The woman recovered and suffered no ill-effects except for the usual ventral hernia which she made the subject of legal proceedings, alleging that the wrong type of needle had been used to close her wound.(Baudelocque 1801).

As recently as 1862, the difficulty was appreciated. In that year, Schwarz, (1862), the Medicinabrath (public medical recorder and adviser) at Fulde, wrote "if a man is fortunate enough to obtain a living child by the

Caesarean section on the dead mother, he places himself of being in the unfortunate position of being suspected of having operated on a woman in a trance or he burdens his conscience with having waited so long for the death of the mother, that he has allowed the child to die." He quoted from the records of his own duchy, 107 cases, all having occurred in Kurhessen between 1836 and 1848, out of 336,941 births, and "not one living child was extracted." In support of his views he mentioned the writings of Scanzoni who believed that the instant the death of the mother took place, so did that of the child. Such utterances are in striking contrast to the conviction held by various peoples throughout the ages.

Of the laws on the subject passed by lay bodies, mention may be made of that of the Council of Ulm, which in addition to prescribing it, gave the formalities of its execution and instructed that the "stupid parent" be informed "that if he omitted any possible means of saving the life of the child", he be "put upon his conscience" but "could not be compelled to submit." This law was passed in 1740.

In 1749, the King of Sicily ordered that physicians who neglected to perform post-mortem Caesarean section on women who died in the last months of pregnancy should be put to death. In the first half of the eighteenth century, Pope Benedict XIV issued "church directions" for the operation and so tempered his commands as to require the measure only "in case the child be

living and in order to receive the holy ordinance of baptism."

With the same general objects in view, laws have been enacted as follows:- By the City Council of Frankfurt in 1786, by the Duchy of Kuhlnessen, 1767 and 1787, the Austrian Law of 1757 which instructed that "the operation shall be carried out with the same care as if the woman were living"; the Theresian Law of 1768- "if a pregnant woman commits suicide, open the body as much as necessary, only that the child shall not be deprived of a Holy Christian burial;" the Leffe Detmold Law of 1789; by the Grand Duchy of Baden in 1827; at Wurtemberg 1775; at Nassau in 1818 - "if the mother has been pregnant five months"; the old Saxon Law; the Bavarian Law of 1816 - "the midwife to treat the patient as if in a trance until the physician arrives"; and the Russian Law which left every thing "to the judgement of the physician." (Duer 1879)

The Church, being concerned with the saving of souls as well as the lives of children, all through the centuries has been a strong upporter of the operation, especially where the alternative was craniotomy.

It was laid down in the Catholic code of Canon Law that, if a pregnant woman dies, the Caesarean section should at once be performed and the child baptized, if alive. The actual text of the Codex Juris Canonica runs as follows:- " Si mater praegnans mortua fuerit, fetus ab iis ad quos spectat extractus, si certo vivat, baptizitur absolute: si dubie, sub conditione." Genecot, one of the foremost authorities on the interpretation of

Canon Law, has made reference to the case in which the medical attendant does not feel himself competent to perform Caesarean section, in the following terms: "Quod si in aliquo raro casu, sectio reapse peragi non possit, curet saltam medicus fetum in utero, securiore quo potest modo, abptizere." (Theologia Moralis, vol.2. tract XlII,145.)

Bishop Bouvier's "Sacred Embryology" expressly ordered Caesarean section to be performed immediately after the mother's death, adding that "no endeavour must be neglected to procure the services of a professional man. If this is impossible, a midwife, some other woman, a married woman, or in case of urgency, anyone at hand may be resorted to, but never a priest unless there is absolutely no other person who can be procured."

Mention may be made here of a case which occurred in Brittany in 1846 and gave rise to much discussion at that time. A woman died in her sixth month of pregnancy. The medical man who was summoned refused to perform Caesarean section. The priest then sent for a neighbouring farmer who carried out the operation but the foetus was dead. Whether or not the child would have been born alive, is, of course, open to doubt, but the affair created a great sensation at the time. (Bouvier 1846).

It is obvious from these laws and instructions that religion played a large part in encouraging the performance of post-mortem Caesarean section, in order that the child might be baptized. At the same time, various contrivances were invented to dispense with the necessity of the operation

and yet confer the rite of baptism upon the infant. Intra-uterine injections, by means of a syringe, were suggested, the validity of such a proceeding being admitted by the high authorities of the Church.

The unfortunate experience of Schwarz led him to an entirely erroneous conclusion, for there are in the literature, series of cases where the lives of children have been saved by post-mortem Caesarean section, although there have been many more failures than successes.

Bordenave (1785) cited a number of cases mentioned by M. Cangiamila in the *Emryologica Sacra*. On that authority, he remarked that in the city of Montreal and the neighbourhood, in the space of 24 years, 21 living children had been extracted by the Caesarean section, performed post-mortem, between 1704 and 1728. Sixty operations were reported from Caltanissetta, of whom only five were found dead; at Victoria a city in the diocese of Syracuse, between 1735 and 1752, the Caesarean operation was performed on twenty women after their decease and in every case a living child was extracted, and that at Sambuca, a city in the diocese of Gisi, 22 pregnant women having died, from 18 of these, children were extracted alive. "When, therefore, a pregnant woman dies, especially in advanced periods of that state, the Caesarean operation should never, he thinks, be neglected, but ought to be regarded as an act of humanity."

Velpeau (1831) cast grave doubts on the accuracy of these statements and, having regard to the percentage of successes given by later writers, there would be good

reason to do so.

Bordenhave (1785) himself in 1774, described a remarkable, but to say the least of it doubtful, case, in which a woman supposedly six months pregnant, died at one p.m. Her body was opened six hours later and a child extracted which, he declared, showed signs of life. The heart beat was palpable and respiration started after a very short time; the child lived two hours.

Duer (1879) mentioned various series of cases and gave the results. Hyman and Lange reported 331 cases occurring in the 19th. century up to 1878 but only nineteen children were saved. M.deVilliers is reported as having published a thesis in 1838 on post-mortem Caesarean section, describing 49 cases, in which seven infants were dead on removal from the uterus, seven survived and the remaining 37 (there were two sets of twins) lived for periods varying from a few minutes to 34 hours.

In the Gazette Hebdomadaire, November 1860, 22 further cases were mentioned. Nine of the infants were dead, six survived and the remainder lived for a short time, none exceeding five hours. At a meeting of the Berlin Obstetrical Society in 1864, Dr. Boehr referred to the series in Casper's Wochenschrift. In these but three children were saved from 147 women.

Duer himself reported 52 cases of post-mortem Caesarean section. From these, 54 children were extracted; eight were dead and eleven lived but a short time.

Hallman (1914) quoted by Harrar (1915) collected 68 cases

with 61 per cent of living children, while Harrar in 1915 reported ten cases from the New York Lying-in Hospital. Three were born dead, four could not be resuscitated although born with hearts still beating, one lived six days and the remaining two left the hospital alive and well.

Other collections worthy of notice include those of Garezky, (Harris 1880), of St.Petersburg, 379 cases with but five successes, Norris (1895) 453 cases, 45 successes, and lastly Pfaff's "well authenticated cases", 52 in number, from which 22 children were saved.(Pfaff 1916).

The figures, as seen above, vary tremendously when the percentage of children saved is considered, varying from nil to 68 per cent. successes. At first sight, it would appear that some of the statements made must be inaccurate; Harrar doubted that authenticity of some of Duer's cases but Harris considered Garezky's to be reliable. Possibly the cause of the mother's death in different cases and the period of time which elapsed between that and the operation afford some explanation.

As regards the period of time that a child may survive in utero after the death of the mother, here again opinions differ but de Lee's (1928) statement that a foetus will survive from 5 to 20 minutes after its mother's death is generally accepted. He declared that reported cases of longer periods are not authenticated, an opinion supported by Bacon (1911). M.Hatin (1861) of Paris declared that "examples are known of children having



been extracted and revived several hours and even days after decease of the pregnant woman. Such statements are unbelievable but cases have been recorded where delivery of a living child has been accomplished two hours after the death of the mother.

The most remarkable is probably that reported by P.A.Verouden (1876). His patient was a multipara aged 35, in the sixth month of pregnancy, who died suddenly from haemoptysis, the result of phthisis. "On my arrival, two hours after the death of the woman, I perceive still distinctly with the stethoscope, the tone of the heart of the foetus." He immediately performed Caesarean section and "had the satisfaction to give birth to a living foetus which was not yet six months of age. It was brought prudently to the parish church, received the holy baptims, and lived still several hours after the ceremony."

Hubert mentioned a case where a woman was delivered of a live child by Caesarean section two hours after she had been killed in a railway accident (Goul<sup>d</sup> & Pyle, 1897), while in yet another, a child was removed alive between  $1\frac{1}{2}$  and 2 hours after the mother's death from haemoptysis, the result of pulmonary tuberculosis (O'Hara 1874).

While the authenticity of the cases just cited must be open to grave suspicion, there seems no justifiable doubt about the accuracy of two cases reported just over 60 years ago in which living children were obtained by post-mortem Caesarean section performed one hour after the death of the mother.

The first of these was related by J. H. Blatner (1875). The woman, a multipara, 26 years of age, died suddenly, which news was sent to Blatner by messenger. He seized a pocket case and, on the way to the house, summoned a colleague to assist him. Finding the woman dead, he immediately opened the abdomen, one hour having elapsed since the mother's death. The baby was found to be asphyxiated but was resuscitated by "extraordinary efforts." It lived for ten minutes.

The second case, even more remarkable, was related by J. L. Cleveland (1878). The mother died of convulsions which had been going for two weeks. Owing to a number of circumstances, Caesarean section was not performed until the mother had been dead for one hour. The child was asphyxiated but the heart beat perceptible. It gasped and after one hour, was fully restored. It "was small, near full term and is still alive and in good health."

The length of time which passed between the death of the mother and the removal of the child in these two cases was much more considerable than was generally accepted to be the extreme limit of possible hope for survival of the child. Cleveland believed that when viability was limited to fifteen to thirty minutes after maternal death, the well known capacity of the foetus for resisting asphyxia is not taken fully into account and that it would be increased by the residual oxygen within the placenta at the time of the mother's death.

By way of contrast to these remarkable stories, it may be noted that, in Garezky's series of cases, a large number of the operations were performed within one minute of the mother's death and yet the child was asphyxiated or dead.

Besides the time factor, the cause of the mother's death frequently determined the success or otherwise of the operation. Hemming, quoted by Duer, seemed to arrive at a true statement of the facts when he formulated his observation - "The results of an operation performed post-mortem matris are little favourable to the child but it is most likely to succeed when death has followed some shock to the nervous system; less favourable to the child when the death agony has been prolonged; and the most unfavourable when the mother has been suffocated by carbonic acid gas." This last rather curious sentence presumably must refer to diseases in which anoxaemia is a prominent feature, heart disease, severe blood disease and such like. Hallman drew attention to the fact that the prognosis for the child is better in sudden, rapid and violent death, diseases of the central nervous system, heart and kidneys than after long continued or infectious diseases, diseases of the blood, or intoxications in which the blood is altered.

In olden times, life for the infant was believed possible after a gestation of six months or over and in more recent times, 1879, this view was supported by Duer "in favourable cases". He declared "Leaving out of view any question of Church rites - which are still

insisted on in the Roman Church - I advocate this earlier period for yet another reason, that there may occur in certain cases, good and urgent legal motives for the preservation of the life of the child, even though it be only for an hour."

Other writers did not agree with this view however. Thatcher of Edinburgh, in pleading for the more frequent performance of the operation, advocated that it should be done in all cases where the period of gestation had reached seven months while Berg urged its performance after the 33rd week.

Post-mortem Caesarean section has never been a frequent operation in Great Britain although cases have been reported from time to time.

J. H. Green (1823) reported a case of a woman in the last week of pregnancy, who was run over by a stage coach on 15th April, 1820. She died 20 minutes later and after a further 13 minutes, an asphyxiated child was removed by Caesarean section. It was resuscitated with difficulty and lived only 34 hours. A successful case was also reported by Dawson in 1837.

In 1850, G. Harley, reported a case from Edinburgh where the woman died suddenly from acute pulmonary oedema in the 37th week of pregnancy, the operation being performed immediately after her death. The child was saved. In 1877, Squire reported a success although the operation was not performed until almost half an hour had elapsed after the mother's death from rupture of an aneurysm.

P. Tytler cited a remarkable instance in 1906. The

mother died in the eighth month of pregnancy from meningitis. Efforts were first made to deliver the child per vaginam but failed as the parts could not be dilated sufficiently. Post-mortem Caesarean section was then performed and a living child obtained.

Coming to more recent times, an interesting case was described by G.W.Yule (1925). The patient, a primipara of 25, who had been in hospital for treatment for pre-eclamptic toxæmia, collapsed and died whilst "low" forceps were being applied to extract the child. The abdomen was opened and the child removed but efforts to revive it failed. It was then discovered that there was a second child in the uterus. It was removed and after 30 minutes treatment, it revived. Ten minutes had elapsed between the death of the mother and the extraction of the second infant.

In 1927, Rosin described a case at Bury. The patient, who was near to the end of her pregnancy collapsed and died a few minutes after admission to hospital. Fifteen minutes were spent in trying to revive her but this failing, Caesarean section was performed and an asphyxiated child was removed, which recovered.

During the past ~~thirteen~~ years (up to the end of 1940) 18 cases have been reported, 11 from the continent of Europe, 5 from U.S.A. and one each from Great Britain and India. From all of these, results ascertainable were, 17 children saved, there being one case of twins.

This last case was reported from U.S.A. in 1938, the mother dying suddenly from a heart attack. The

operation was performed within seven minutes and both children were saved (Harrison 1938). In the most recent British case, reported by Morgan in 1940, the mother died from eclampsia. Operation was performed within 5 minutes and was successful.

In spite of religious thought, the question of civil or criminal responsibility must be thought of by any surgeon who would perform a post-mortem Caesarean section without the consent of the <sup>e</sup>d<sup>i</sup>ceased<sup>'s</sup> relatives. This is still a matter of controversy to which considerable attention has been given in U.S.A.

The majority of present obstetricians have met with few, if any, such cases. Thus Munro Kerr (1937) states that his experience has been limited to five cases, only one of which was successful, the mother having died suddenly during the administration of an anaesthetic given to perform version. The late Dr. Haig Ferguson said in 1926, that he had never met with such a case. Their infrequent occurrence is no doubt due to several factors, not the least of which is efficient ante-natal supervision and treatment, which few women <sup>lack</sup> escape nowadays.

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No account of the evolution of the modern technique of the operation of Caesarean section can be considered complete without reference to the question of sterilisation of the woman during its performance.

No question connected with the ethics of surgery has been the subject of such variance of opinion. The procedure to be adopted has, like every other step in the operation of Caesarean section, been the subject of much dispute.

The first to suggest that the patient should be sterilized was Blundell. In 1834 edition of his textbook, "The Principles and Practice of Midwifery", he wrote "Before closing the abdomen, the operator, I conceive, ought to remove a portion, say one line, of the Fallopian tubes, right and left, so as to intercept its calibre." As if conscious of what the future would bring forth, he stated that while mere division of the tube might be all that was necessary, resection of a portion of it would be more efficient. As previously mentioned Blundell, and before him, Michaelis had suggested the extirpation of the uterus at the time of performing Caesarean section, but this was done to decrease the risk of operation, not with a view to preventing further pregnancies.

Looked at from the historical point of view, sterilisation can be considered under two headings:-

- (1) Methods adopted with a view to avoiding future pregnancies.
- (2) The ethical standpoint.

The various methods adopted for the purpose of sterilisation can be divided again into three groups according to the organ or organs subjected to surgical or other interference.

- (a) Operations on the ovaries.
- (b) Operations on the uterus.
- (c) Operations upon the Fallopian tubes.

Removal of the ovaries was the first method to be considered for the reason that the occurrence of pregnancy was believed to be impossible if ova could no longer mature and be cast off. Gradually, however, as the fundamental importance of internal secretory functions of these organs became recognised as well as the serious disturbance associated in some women with a premature menopause, this method was abandoned. There was also some considerable risk of haemorrhage. While the uterus is undergoing involution, the pedicles are liable to marked strain which may cause slipping of ligatures.

This operation was first carried out in 1863 in U.S.A. by Dickenson (Harris 1878). The patient was a negress who had undergone a successful Caesarean section, necessitated by deformity of her pelvis, two years previously. She died after the second operation. Details of the operation are scanty and it is uncertain whether the object in view was sterilisation of the patient or treatment of the deformity of the pelvis, possibly the result of osteomalacia.

This procedure was never a popular one and found

favour with but few. C.A.L.Reed (1893) preferred this method of sterilisation but the great majority of obstetricians were against it. Further, there are several well authenticated cases where pregnancy has occurred following removal of both ovaries for cystic disease. Such were reported by Sutton (1896), Doran (1902), Robertson (1840) and others.

Pregnancy following bilateral oophorectomy was at first believed to be due to the fact that not all the ovarian tissue had been removed, but later, in 1921, C.D.Lochrane drew attention to isolated areas of functioning ovarian tissue frequently situated far from normal ovarian sites, and often detectable only by microscopic examination, being more frequent than at one time believed.

Sterilisation by Xray treatment of the ovaries scarcely falls within the scope of this review but Regaud (quoted by Lockyer 1914) has shown it to be unreliable.

Blumberg, in 1913, recommended burial of the ovaries in closed peritoneal pouches but it was not favourably received. In addition to the possibility of the presence of accessory ovarian tissue, there is the well known tendency to slow resolution of aseptically produced peritoneal adhesions and the consequent opening up of artificial peritoneal pouches.

Removal of both Fallopian tubes and both ovaries was suggested by Sonntaf (quoted by Wallace 1902) in

Germany in 1894, by Dudley in America in 1895, and Playfair and Herman in this country in 1889.

Removal of the uterus as a method of sterilisation was particularly favoured by certain London obstetricians, particularly W.Duncan and J. H. Targett (1900), at the beginning of the present century. Some however, such as Murdoch Cameron (1902) and H. R. Spencer were strongly opposed to hysterectomy, the former at the 1902 annual meeting of the British Medical Association, protesting against the "appalling frequency of hysterectomy along with Caesarean section, as advocated by some members of the London Obstetrical Society."

The procedure termed atmocausis - practically a cooking of the uterine mucosa by hot vapour - is more of academic than practical interest. First recommended by Pincus, it was shown to be a dangerous and uncertain method (Lochrane 1921).

The number of operations designed to stop the function of the Fallopian tubes is large, indeed the multitude and diversity of the methods is a fair indication of the unsuitability of any one of them.

The first attempt at tubal sterilisation was made by W.T.Lungren of U.S.A. in 1881. In performing Caesarean section upon a patient for the second time, he tied silk ligatures round both tubes, about one inch from their uterine insertions in the hope of avoiding a third operation. It is interesting to note that he had an idea that such interference might influence the menstrual function. This method was very popular for

some time and up to 1897, Nurnberger (quoted by Williams)(1920) collected 42 such operations with 2 failures. As time went on however, reports of failure became more frequent, such as described by V.N.Leonard (1913), A.V.McArthur (1920), and J. W. Taylor (1904). The case reported by Taylor deserves special mention. His patient was a strumous dwarf who underwent her first Caesarean section on March 29th 1901. The tubes were tied with a silk ligature. Nevertheless, a further pregnancy ensued, necessitating Caesarean section,  $2\frac{1}{2}$  years later. Some degree of atrophy was seen at the site of ligature. Once again the tubes were ligated. Less than a year later, Caesarean section was again required. This time, the whole of each tube, a small portion of each corresponding cornu of the uterus and one ovary were removed.

In Great Britain, this method of sterilisation was used by Sir Francis Champneys in performing the first successful Sanger operation (1889). An aneurysm needle, armed with kangaroo tendon, was passed round each tube, half way along its course. Tying it tightly, the ligature cut completely through the tube. Playfair (1889) considered that there was a risk of haematocoele or peritonitis following such a procedure.

It was next suggested that the object might be accomplished by applying a double ligature to each tube and excising a portion of the tube between them. The experiments of Fraenkel (1899) upon animals and the

experience of Zwiefel (1897) upon the living woman showed that even these measures did not ensure against conception as the ligatures might become absorbed and the cut ends of the tube become re-united.

Division of the tubes between ligatures without excision of a part of the tube was suggested by A.D.Leith Napier in 1892. Some writers have stated that Kehrer was the first to suggest this procedure but as the date of his suggestion was 1893, this was obviously incorrect.

In the same year, Sir Francis Champneys (1892) suggested a slight modification of his original plan. After applying a simple ligature, he pinched up a loop of the tube, tied this with the ends of the first ligature and then cut away the loop. By so doing, he avoided leaving a raw or bleeding edge.

Apart from subsequent uterine pregnancy following such measures as these, there was also the danger of ectopic pregnancy occurring in the remaining stump of the Fallopian tube. Such cases have been reported by J.C.Wood (1917) and J.O.Polak (1910). There are also a number of cases on record where pregnancy has occurred in the tubal stump after partial removal of that organ for disease. Such have been described by <sup>H</sup>M.Clifford (1914) and M.G.Pearson (1909).

Herman (1893) went further and in 1893 removed both tubes as close to the uterus as consistent with secure <sup>in</sup>ligature. He appears to have been the first



to do so but did not consider it a certain method of sterilisation. In his view the only safe method was removal of both ovaries but the undesirable after effects precluded the use of that method.

The method described by Champneys in 1892 was the most popular in Britain for many years but several clever modifications were suggested, by American surgeons.

P.A.Harris (1909) suggested implanting the severed proximal ends of the Fallopian tubes in the upper posterior aspect of the fundus of the uterus, flattening them out and suturing them to a peritoneal area previously denuded. Such a procedure was first carried out by F.H.Todd in 1899, (Harris 1909). This method, with modifications, was revived by N. Kouchraloff in 1930. He brought the severed proximal ends of the tubes in front of the uterus, uniting them end to end. This suture line was covered by pulling up a fold of utero-vesical peritoneum and attaching it to the uterus.

Harris's clever method, and that of Fry (1909) who buried the severed proximal ends of the tubes in the broad ligament, had the great advantage of leaving the lumen of the tube intact and making it possible to re-establish connection between the cavity of the uterus and the ostium abdominal, should conditions demand the re-opening of the right of way.

Polak (1909) on the other hand, proposed excision of the uterine end of the tube by an elliptical incision into the cornua of the uterus, encircling the tube

and then enclosing the incision in the uterine muscle with catgut sutures.

Another method of dealing with the cut ends of the tubes was to cover the proximal end with peritoneum. This was believed to be an absolute safeguard but A. Crooks (1920) reported a case of full-time pregnancy occurring after such an operation.

The embedding of the fimbriated ends of the tubes under peritoneum was popular for a time, usually in pockets or through incisions in the broad ligament.

Childs (1920) recommended investing the fimbriae into the tube and then closing the lumen by means of a purse string suture.

Ligature after crushing of the tubes, sometimes called the intestinal method, and tubal crushing alone, were shown to be ineffective by Offergeld (1907) and Casalis (1907).

Lastly, may be mentioned cauterisation by chemicals or heat as suggested by Fraenkel and electro-cauterisation of the intra-tubal openings as described in 1916 by R.L. Dickinson. According to Zinke (1888) cauterisation of the tubal openings had been proposed 30 years before by Froreip and Kocks.

2 In modern times, the most popular method is removal of the tubes and burial of the stump under the peritoneum at the side of the uterus.

*Incomplete* So much for the methods of sterilisation, an almost universal custom in the days when the mortality from

Caesarean section was high. With the improvement in results, many came to doubt, from an ethical standpoint, the correctness of such a procedure.

One of the very earliest to consider this question was E.G.Zinke in 1888. He wrote "Whether we should concede to a woman who has been repeatedly delivered by Caesarean section, the right to decide for herself whether or not she wants to be sterilized if another operation should become necessary, can certainly not be answered in the negative.." At the same time, he stressed the good results from repeated Caesarean section, mentioning 48 women who had undergone between them 119 operations with but 8 deaths. During the first few years of this century the matter frequently came up for discussion at meetings of obstetrical societies.

At a meeting of the London Obstetrical Society in 1900, such speakers as W.Duncan, J.H.Targett and P Horrocks were strongly in favour of sterilisation while H.R.Spencer opposed Caesarean hysterectomy in cases of permanent pelvic obstruction and would have nothing to do with cutting or tying the Fallopian tubes, as he considered conservative Caesarean section the proper operation in such circumstances.

The following year W.J.Sinclair (1901) also expressed himself as opposed to sterilisation, an opinion supported by the great majority of his colleagues.

At a meeting of the American Gynecological Society in 1902, C.M.Green (1903) took up a very strong position. He remarked "It is said that many women who come to

Caesarean section, belong to the depraved class, are often illegitimately pregnant, that they and their progeny are likely to become a constant burden to the state, that the fertility of such women is therefore undesirable and hence that it is justifiable to sterilise them on performing their first hysterotomy. Is it then considered justifiable to castrate men of the depraved pauper class with a view to diminishing illegitimacy and pauperism? And would it be well to go further and sterilise depraved pauper women without regard to their capacity for normal childbirth?"

"Is it right that as physicians we should assume to judge, in advance of civil law, who should and who should not be allowed to have children? Has the time come when it is right to burden the medical profession with decisions of such great responsibility?"

He asserted that "the only safe and moral ground for the medical profession was that based on modern medical science, influenced by sociological conditions." "If a woman comes to Caesarean section and recovers, she and her husband, if she has one, should be informed of her condition and of the prognosis and treatment in the event of a future pregnancy; if a subsequent pregnancy ensues, the responsibility of treatment rests with the obstetric surgeon but the responsibility for her condition rests elsewhere."

He was followed by J. Whitridge Williams who distinguished between patients of the pauper class and

"women in the upper walks of life." Regarding the former, he said "I do not believe we are justified in allowing pauper patients to be subjected to repeated Caesarean section unless they particularly desire it; for the reason that many of the persons possess such a low grade of intelligence as to neglect to place themselves under proper surroundings for a subsequent operation." As regards "women in the upper walks of life" he believed they should share the responsibility with the physician. "In such cases the husband and wife have a right to demand sterilisation though I should earnestly dissuade them from it after the first operation and point out to them the possibility of the death of the child and the absolute impossibility of having another child after such an operation." While leaving the matter entirely in the patient's hands, should a second Caesarean section be required, Williams then advised sterilisation, either by hysterectomy or excision of the uterine end of the Fallopian tubes.

A similar discussion followed a paper by J. M. Munro Kerr in 1905 in London. He opposed sterilisation of "Strong, healthy, uninfected parturients" at their first Caesarean section but agreed to it at the second or third operation. For patients who were in delicate health owing to such causes as organic heart disease, he recommended sterilisation, at first operation by hysterectomy. Herman, at the same meeting, declared that it was for the surgeon, not the patient, to decide

whether sterilisation should be performed, an opinion supported by Routh.

H. R. Spencer on the other hand declared that "the matter was an ethical one to be decided entirely by the doctor and that his duty was to deliver the woman and restore her as nearly as possible to a natural condition, a result obtained by the conservative operation without sterilisation and not by the mutilating operation of hysterectomy nor by the unreliable and dangerous one of tying the tubes. If the patient became pregnant again, the responsibility was not the doctor's, whose duty was to repeat the Caesarean section which experience had shown to be very safe." Cullingworth also spoke in the same terms.

C.M.Green repeated his opinions in America in 1909 and he was strongly supported by J.O.Polak who declared that "no operation which has for its purpose the deliberate sterilisation of the childbearing woman is justifiable at the time of the primary section except in the presence of definite and apparent and pathological lesions which in themselves jeopardise the future life and health of the woman." Green strongly objected to Willaim's views regarding different classes of patients. Cushing thought the woman herself should decide the question, an opinion shared by Fry. A. L. Smith stated sterilisation unjustifiable unless the woman demanded it. The majority of obstetricians were of the view that the patient's wishes should be acceded to.

So the argument went on. The general consensus

of opinion today is that the operator has no right to sterilise a patient without her consent and approval but that he should consent to do so, if, after a full explanation of the situation, the husband and wife demand it. Munro Kerr states that, in the Glasgow Maternity Hospital, it is difficult to persuade patients to undergo Caesarean section more than twice, although we hear of patients who have undergone the operation five or even seven times with safety. No one can complain that a woman who has undergone the operation two or three times has not done her duty by her family.

It is interesting to note in this connection that the Roman Catholic Church has taken a decided stand in this question, and forbids the sterilising of the women by the removal of the tubes or ovaries except it be to save life, which there is grave, well founded reason to fear, would be imperilled by the necessity of a second operation. This Church bases its teachings on the command, "Be ye fruitful and multiply." Marriage, it claims, is an institution ordained by the Creator primarily for the propagation of the human race, and nothing should or can lawfully be done which will in any way hinder its object.

To conclude this section, a few words may be said with regard to the legal position. "To do anything to the person of another without his consent is an assault, a wrong for which the offender may have to pay damages even though he does no actual harm"..... Sterilization may be lawfully carried out for sound therapeutic reasons



but sterilization for eugenic reasons is probably unlawful, although the law on this point is a matter of pure speculation." A defence society recommends that before a sterilizing operation be performed on a woman, she should sign a certificate of consent, admitting that the effect and nature of such an operation has been explained to her. It is also suggested, though not strictly necessary, that "A married woman has the full disposal of her own person and may consent to any lawful operation upon herself and then her husband has no legal right to forbid it. There is no particular reason to suppose that he has any paramount right to forbid a sterilizing operation which is necessary on medical grounds, and to which the wife consents, but the point <sup>has</sup> never, so far as I can ascertain, come before the courts." (Kitchin 1941).

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CAESAREAN SECTION

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J.H.Young, M.B., Ch.B., D.T.M. & H.  
(Edin.).

October 1942.